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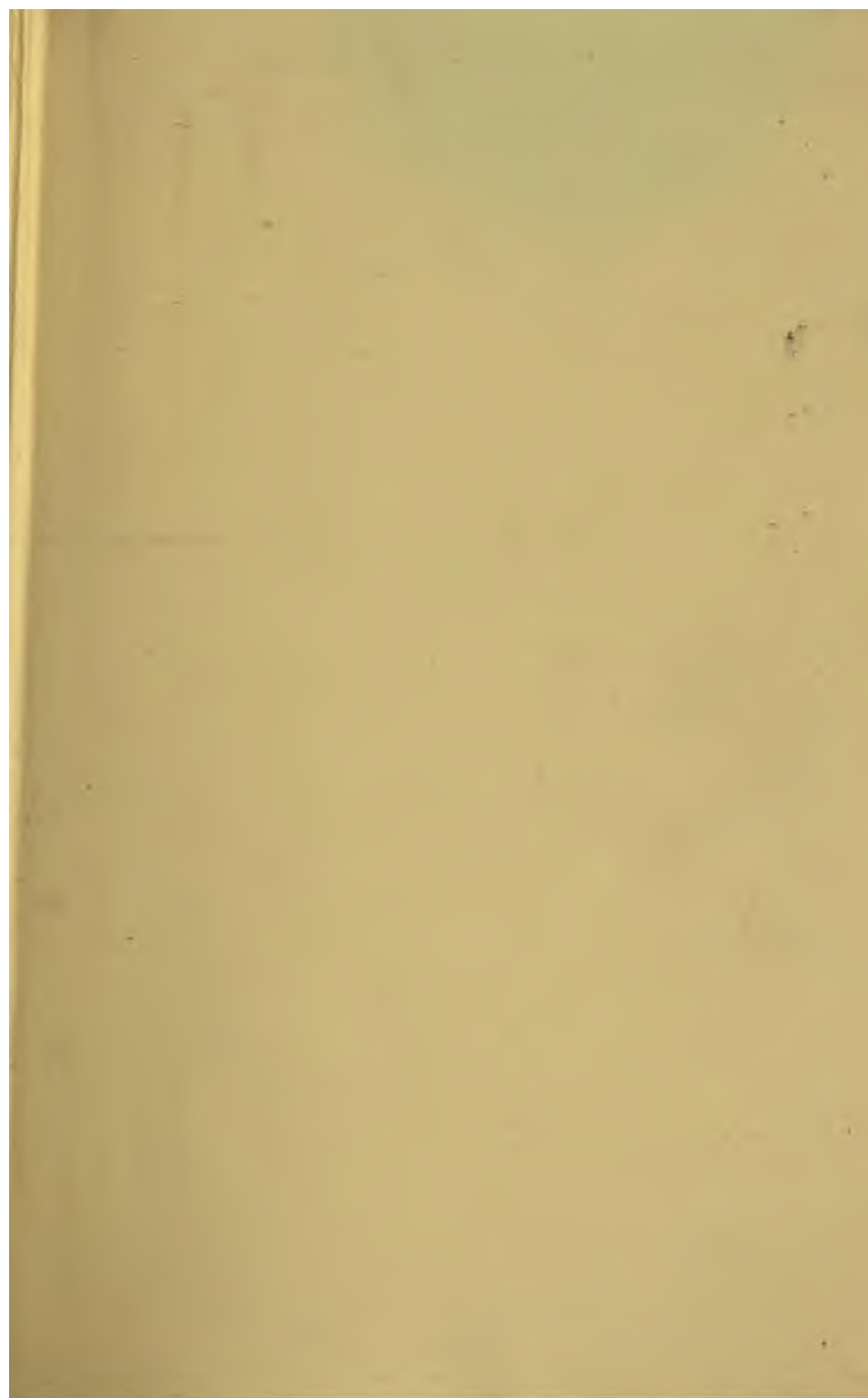
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A TREATISE, PRACTICAL AND THEORETIC
ON
CANCERS AND THE CANCER-PROCESS

BY
HERBERT SNOW, M.D. (LOND.), ETC. .
SURGEON TO THE CANCER HOSPITAL



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P R E F A C E.



THE present work embodies endeavour to present a concise view of the manifold varieties of Cancerous Disease ; to elucidate their individual causes ; to explain the phenomena which attend their development ; to show how each may best be combated. It consists of three portions. The first discusses, on general grounds, the nature of cancer, classifying all the morbid growths which display any claim to the attribute "malignant," and seeking to account for the most striking features in their clinical career. At the same time it brings prominently into view the essential uniformity and identity of the pathological law, to all appearance underlying these disease-manifestations ; so dissimilar in detail, so closely analogous in kind. It traces every particular species to the acquisition, by a limited group of cell-elements, of autositic properties ; bracketing together the resulting tumour-products, and at the same time indicating their relationship to Benign forms of tissue-hyperplasia, by the epithet "cancer-process."

The second part deals with the structural anatomy and clinical career of particular species. Two principal aims have been here kept in sight ; one, to clearly display the principles, microscopic or otherwise, upon which a new growth can be correctly referred to its parent tissue ; the other, to simplify existing nosology, so far as was found compatible with accuracy

and with lucidity. It was believed that much gain might hence accrue, not only to the over-wrought student, groaning under the encyclopædic mass of *fin-de-siècle* medical literature, but also to future labourers in the same department of science. To this end the work has been materially condensed.

Thus, the presence of Spindle-cells, of the malignant type, ranged in bands, is regarded as the pathognomonic test and badge of cancer-products of the several connective-tissues; and exception is taken to the description of any tumour as a "sarcoma" without the existence of this element as a conspicuous feature in microscopic sections. The vague and uncertain sense in which that word is now commonly employed is made the subject of stricture. In particular it is shown that the "round-celled sarcomata" of previous writers are referable to one or other of several distinct classes; to which therefore such tumours are here relegated, the term in question being abandoned. The "myeloid" sarcoma again is discussed as but a variant of the spindle-celled, not meriting recognition as a separate species.

On the other hand, the importance of cancerous developments in the lymphoid or adenoid tissues is prominently brought into note; these lesions being for reasons stated in the text designated by a novel title "Lympho-carcinoma." The hitherto hardly recognised malignant growths of non-striated muscle are considered as "Myo-sarcoma," being at the same time differentiated from the embryonic rhabdo-myomata, heretofore passing under the same designation. The "Melanotic sarcomata" are divided into two groups: one, properly so styled, as a true growth from ocular connective-tissue structures; the other derived from the pigment-cells of the Malpighian layer, and therefore an epidermic product. In both cases the impossibility of origin except from cell-elements which normally secrete *melanine* is insisted upon.

The class "Cylindroma" is restricted to those cancerous

growths of the lower part of the alimentary tract which reproduce the characteristic structures of that region. The precise shape of epithelial cells lining mucous surfaces is shown to be non-essential (that word being employed in the logician's sense) and unstable, fundamentally varying with conditions, often extremely transient, of their environment. Columnar cells generate malignant parenchyma, not morphologically distinguishable from the cancer-product of squamous epithelium. Hence the term "columnar epithelioma" is here disused. In place also of "duct-cancer" two distinct forms of Intracystic Vegetation are described, one ranking with the carcinomata, the other with sarcoma. "Colloid cancer" is defined as the result of a mucoid degeneration-process precisely analogous to the transformation of connective-tissue elements in Myxoma. Two species of the latter are distinguished, the malignancy of the "mixed" variety being accounted for by the presence of spindle-cells.

The variability of the line of demarcation between benign and malignant tumours, a point fully recognised by the last generation of practical surgeons, is anew indicated and exemplified; in particular the tendency of ALL new growths in the devolutionary mammæ of elderly women to become directly or indirectly associated with cancer is affirmed. Rare examples of a cancer-process in tissues ordinarily exempt, such as fat, cartilage, even bone, are narrated. Maladies, some common, some extremely exceptional, bearing affinity near or remote to cancer, are described and defined. In the account of Cheloid, obliteration from text-books of the supposititious lesion bearing the name of Alibert is advocated; elsewhere various sources of fallacy in current nomenclature, such as ambiguous use of the terms "lymphadenoma," "alveolar sarcoma," "osteo-sarcoma," &c., receive necessary remark.

My discovery of "Marrow-Infection" commonly attendant upon carcinoma of the female breast, with its remarkably

latent physical signs, is referred to, not only in connection with that particular local development, but also with the metastatic marrow-deposits (not usually "insidious"), of other cancer-species. It is further advanced in explanation of some previously obscure diseases in bone. Other striking cancer-phenomena, *auto-inoculation*, *wide dissemination in the subcutaneous tissue*, are discussed in conjunction not only with those varieties in which they commonly occur, but with kinds in which they are only rarely and exceptionally witnessed.

In the new class of morbid growths denominated "Blastoma" and placed in Appendix A., the origin of some mysterious malignant and quasi-malignant tumours from embryonic vestiges is demonstrated. Sufficient positive knowledge has been attained to make this differentiation both needful and valid, many obscurities of etiology being thus elucidated. The inclusion theory of Cohnheim, while shown to be erroneous in respect of cancerous maladies in general, is found a correct explanation of this peculiar and limited group, the phenomena of which corroborate the general views of the "cancer-process" here advanced. Still the picture is even now little more than an outline-sketch, whereof many details have yet to be filled in.

The concluding portion of the volume is devoted to a more or less cursory notice of malignant disease in particular organs or parts, with the most fitting measures of cure or of relief. Here I have sedulously striven to combat that despairing attitude, especially in the matter of medicinal treatment, which I find too generally adopted by the modern orthodox practitioner. I conceive this position of hopeless LAISSEZ-FAIRE to be wholly unwarrantable and baseless so far as the bulk of cancer-cases are concerned ; here, moreover, is the ready explanation of that eager resort to gross and palpably fraudulent forms of quackery from which the medical profession has recently very generally suffered. Whenever the methods of

surgery can be brought to bear upon cancer in its early stages, we can, and ought to, cure our patient. When that period is passed, or when resort to surgical art is, from the nature of the case, impossible, we can yet do much by the resources of medicine to check the progress of the disease. And though faint hope that we shall some day in this warfare be furnished with more efficient weapons is as yet discernible, none can doubt that we have hitherto made but feeble and hesitating use of those which have long been ready to our hand.

The conditions which, from a surgical point of view, render permanent immunity a feasible aim, are narrated, and the facility with which most cancerous maladies of external organs can be recognised in their incipient period of development duly pointed out. As the foremost practical consideration for the cancer-surgery of the future, the necessity for removing all lymph-glands in the "infection-path" of epithelioma and carcinoma, *before they have undergone increase in bulk*, a rule of practice first formulated by the author under the title of "The Anticipatory Method," is again insisted upon.

On the side of medicine, the axiom is laid down that in all most prevalent varieties of cancer the proper duties of the medical attendant only BEGIN with the initial operation. The value of early and persistent treatment by opium, even in the most seemingly hopeless cases, is again pointed out, with useful hygienic adjuncts. The harm accruing from severe and "heroic" operations in advanced malignant disease receives emphatic comment, and the unwisdom of indiscriminate recourse to "the knife" is forcibly inculcated.

In the statistical department of cancer, laborious and elaborate work, which in many respects no fresh researches could well advance, has been already done by numerous able writers. From these I have not scrupled largely to borrow, in connection with practical points needing arithmetical illustration, selecting, however, only such figures as seemed

free from the many sources of pathological error which here specially abound.

I am also under considerable obligation to the authors of the copious *répertoire* of cases in the records of the Pathological Society; which I have freely laid under contribution. The engravings by Mr. P. Highley are from my own drawings.

As no monograph upon the entire field of cancerous maladies has appeared for many years, I have laboured to make the present work a *point d'appui* for future investigators. For purposes of reference, modern authorities upon most points of cancer-structure or development have been carefully cited. Doubt is often freely expressed; the weak regions of cancer science are indicated as well as those whereat our foothold seems assured. The ship has been lightened by casting overboard some lumber now grown mouldy and obsolete; of such are the ideas of "constitutional origin" which held heredity as a *vera causa* of cancer. Lastly, an earnest attempt has been made to eliminate those obscurities of diction which so often prove the fertile source of errors in fact.

A main object throughout has been to make clear *principles and laws*, rather than to rest content with chronicling bare facts. The deductive method, somewhat out of fashion in these days, has been resorted to; no less than that of induction. Isolated facts or phenomena, until linked together and viewed in the light of some connecting law, are well-nigh useless for purposes of scientific progress; *à priori* reasoning, in fitting subjection to verification tests, is no less potent an engine of advancement than is its converse. However imperfectly my task may have been performed I trust that it will yet subserve useful purpose in clearing a path to better knowledge.

6, GLOUCESTER PLACE, PORTMAN SQUARE,

March 10, 1893.

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ADDENDUM.

SINCE the note at p. 20 was penned, the want therein indicated has been supplied by the appearance of Dr. Andrew Davidson's important work on *Geographical Pathology*. Further demonstrating the prevalence of cancer as a disease of civilisation, this volume shows that the countries most liable to its ravages are Australia, Austria, Belgium, Canada, England, Germany, Italy, the Netherlands, New Zealand, Norway, Scotland, Sweden, Switzerland, Tasmania, United States. *Per contra*, cancer is very rare or practically unknown in East Central Africa, the plateau of Arabia, Bechuanaland, the Faroë Isles, Gold Coast, Guiana, Iceland, Jamaica, Mauritius, New Caledonia, Persia. In some parts of India, epithelioma is common, while carcinoma is infrequent. In respect of Abyssinia there is a conflict of testimony.

A.

P A R T I.

CHAPTER I.

INTRODUCTORY.

THE NATURE OF CANCER AND THE UNIFORMITY OF THE CANCER-PROCESS.

THE popular word "Cancer" is applied to a large number of diseases, presenting considerable variations in microscopic and macroscopic details of structure, extremely diversified symptoms, and conspicuously contrasted grades of severity. In some a huge, rapidly growing tumour is the most salient feature; in others, the healthy tissues are slowly and deeply excavated. Certain cancers are attended almost *ab initio* by agonising pain; others cause very slight local suffering, even to the end of their career; many again pass through an insidious stage of total absence of malaise, to be followed by a second period of excruciating agony. By maladies at one end of the scale, life is terminated within a brief period of months, perhaps even of weeks; those at the opposite may hardly at all accelerate the approach of death; many, while still proving fatal in the end, permit several decades of useful and perhaps laborious existence. And these startling diversities obtain not only between the numerous species, but also between different examples ranking in one and the same pathological class. Yet, on the other hand, the points of coincidence between all maladies of this extensive domain are no less striking; and it seems hardly possible to doubt that in seeking to account for the development of malignant disease, we have sound reason to assume the operation of a single pathological force; varying throughout in detail, but substantially identical in kind.

In seeking to explain any complicated series of phenomena,

we have the high authority of Darwin for endeavouring, as the first step, to acquire "a good working hypothesis," even should that rest upon no basis of evidence sufficient to confer upon it the rank of a theory. In the case of malignant disease, we are, however, enabled to start with a general view, which, while still involving much that is obscure, rests upon a strong foundation of positive evidence; and, while open to no objection hitherto brought forward, plausibly accounts for all the principal facts.

We first of all note that each species of new-growth considered in the following pages, when submitted to microscopic examination, consists essentially only of cells, blended with the normal tissue-elements of the particular part affected. Many, indeed, are dead; and the appearance of the microscopic section, to say nothing of the naked-eye characters of the growth, are often greatly modified by the results of their decay. But a sufficient number are always living and active; and the most casual glance is sufficient to prove that these are the active agents of the disease-process; moreover, that every abnormal condition we can detect, either with unaided vision or by the help of the microscope, primarily depends upon the behaviour of these infinitesimal morsels of protoplasm, and upon their relation to the particular tissue-environment amid which they happen to be situate. Practically, every cancer is but a mass of actively growing cells.

Pursuing further our analysis, we find that these cells are always the product of pre-existing cells, normal elements of the healthy tissues; that one kind of cancer differs from another only in respect of the particular class of cell, which proves to have been the starting-point of the disease: each separate variety of the latter giving birth to a distinct variety of the former, and the children never failing to exhibit a certain degree of likeness to the parent.

With, however, conspicuous resemblances in relative arrangement, to some extent also in individual characteristics, we see the new cells differ from their progenitors, in being of far larger size; in possessing huge nuclei, which moreover are almost always multiple; in greater liability to degeneration; and, most important of all, in being infinitely more numerous.

They are unmistakeably growing with enormously enhanced vigour, and multiplying with an immensely accelerated rapidity. But beyond the indications of this exuberant proliferation—with its correlative, a more speedy death—no special feature distinguishing the new cells from the old can be discerned by any test or instrument which man has yet devised. Individually regarded, the former appear to bear towards the latter merely the relation which a plant subjected to an energetic process of forcing bears to one in its normal sphere of existence.

It is only when we pass to consider the behaviour of the new cells relatively to their environment that the profound functional modifications which their protoplasm has now undergone become manifest. In every sound organ or tissue a well-adjusted balance of all the component elements is observable; each has its allotted limits; none shows any disposition to encroach upon the domain of the other. In one attacked by cancer, all this is totally changed. The diseased cells flourish, not only out of harmony with those other cells or organised tissues which surround them, but at the actual expense thereof. This not merely by indirectly attracting from them their due supply of nutriment, but by directly eroding, and, as it would seem, devouring them. In a thin section from an actively growing cancer, the ragged fragmentary, eaten-out appearance of the yet remaining organised tissues contrasts with the luxuriant growth and numbers of the army of malignant cell-units, the relations between the two being evidently that of invaded and invaders.

This *progressive erosion* by a host of newly formed cells, is a constant feature of all maladies ranking as cancer, and constitutes one of the two main tests of malignancy. It necessarily varies with many circumstances and conditions; such as the species of cell concerned, the surrounding tissues, the relative consistency of these in different individuals, and at different ages, &c. &c. Sometimes the surrounding parts succumb without resistance to attack; sometimes they yield but gradually; occasionally nature endeavours to interpose a barrier, in the form of hypertrophied fibrous tissue, constituting a capsule or quasi-capsule.

The second badge of malignancy, which, with the preceding, may now be substituted for the fifteen tokens of old associated with cancer, is the peculiar *infectivity* of the new cell-elements ; and the phenomenon of their transplantation (by blood or lymph-currents for the most part), to distant portions of the body, where they grow and flourish, in their turn emitting metastatic offshoots. Hence an ever-increasing number of malignant tumour-formations, until the end arrives. With this must be mentally bracketed the phenomenon of "Auto-inoculation," subsequently referred to in connection with the various species.

Finally, it is to be remembered that the whole complex organism which we term the body, is built up of minute cell-elements which were once, to all intents and purposes, protozoic animalculæ like the amœba ; endowed with powers of independent movement, digestion, respiration, reproduction. The greater bulk subsequently underwent higher evolution into the organised tissues ; a relatively small number still remaining in their primitive unicellular condition, to carry on important functions. The transformation of the former took place, so far as we can discern, by the agency of the central nervous system, acting as an all-controlling mechanism.

The conclusion is forcibly presented to us that the excessive cell-multiplication which we shall find to characterise all malignant lesions, combined with the hostility of the morbid elements to the healthy, is but a process of devolution, of reversion by cells to a primordial amœbiform condition, in which they become parasites, or rather autosites. Inasmuch as the nervous system was not only the controlling agency by which transformation of embryonic cell-units into more or less specialised tissue originally took place ; by means also whereof the healthy balance of component elements is maintained through the somatic life of the organism ; it further seems permissible to regard this "cancer-process" as essentially consisting in a local "cell-rebellion," certain cells casting off their allegiance to the central authority.

The first part of the "autositic" theory rests on ground almost self-evident, and proved by the most perfunctory microscopic examination of any malignant growth. The

second cannot be completely proved or disproved until science has taught us much more than we know at present concerning the ultimate properties of protoplasm, and the relations of that substance to the nervous system. It holds, however, provisional validity until these advances have been made. It derives, however, confirmation from the influence of neurotic conditions in generating some prevalent forms of cancer; from the liability of organs conspicuously influenced by emotion (as the uterus and mammæ) to malignancy, and the preponderance of the more emotional sex among cancer sufferers; from the tendency of special organs, which have passed their functional prime, and are undergoing involution, to the cancer-process; from the rapidly increasing prevalence of cancerous diseases among civilised communities: perhaps even from the relative immunity of savage races, of lunatics, and of idiots.*

The view of cancer-cells as autosites, as practically independent organisms, is strikingly corroborated by the occurrence of "auto-inoculation"; an event more frequently associated with malignant lesions of almost every kind than is commonly supposed. A cancer situated upon any free mucous or serous surface, from time to time incurs the detachment of a few cells, either singly or in small clusters; these become grafted, either upon a part of the membrane in direct opposition to the diseased area, or upon some more distant spot to which they happen to be mechanically conveyed. They then gradually increase in size, and pass through the ordinary course of a malignant deposit. In the later stages of Epithelioma attacking the tongue, or buccal mucous membrane, tiny islets of white epithelium may often be noticed, scattered here and there on the mucous surface, being most abundant in localities with which the primary sore is frequently brought in direct contact; as when the tongue is affected, or the palatine arch. These eventually become separate ulcers with the usual characteristics. The phenomenon never occurs until the disease is far advanced, until the general health is seriously undermined, and until the entire mucous membrane has

* On the latter point, see paper by the writer: "Cancer in its Relations to Insanity": *Journal of Mental Science*, October 1891.

assumed a purplish-red, unhealthy appearance. It would thus seem that a certain process of preparation is needed before the soil becomes capable of growing the new germs. The first indications of this cell-transplantation are seen in the superficial coat of epithelium, thus proving that the white spots are real *grafts*, and not secondary deposits *per* the lymphatics or blood-vessels.

In the peritoneal cavity, as originally pointed out by Dr. Foulis, when masses of cells sprout freely from the ovary or broad ligament, similar nodules are commonly studded over the remaining surface of the membrane, and specially over the area brought into direct contact with the diseased growth. In this case, the ascitic fluid which sooner or later appears, also acts as a medium of diffusion to remote recesses of the abdominal cavity. The following are exceptional examples of the same phenomenon :

A man had a morbid growth in the eye ; which latter was duly excised. After death, at the expiration of a year, a similar deposit was found about the cut end of the optic nerve, and another in the *cauda equina*. The second had evidently been produced by a detached cell or cells drifting down in the sub-arachnoid fluid to the bottom of the spinal canal.—Mr. De Morgan, *Path. Trans.*, vol. xviii. p. 222.

In a man who had died with a large ulcerated mass of epithelioma in the trachea, minute masses of the same were found scattered through the lung, at the extremities of the smallest air-tubes ; detached cells having evidently been carried hither by inhalation.—Dr. Moxon, *Path. Trans.*, vol. xx. p. 28.

A cystic tumour of the lumbar glands bursting shortly before death, scattered bits of the growth through the abdomen ; after death these were found to have adhered to the peritoneal surface of the intestines and other viscera, and to be actively growing.—Dr. Dickinson, *Path. Trans.*, vol. xxii. p. 292.

Mr. De Morgan (*On Cancer*) relates auto-inoculation from a very pendulous mamma to a point on the skin of the thorax corresponding to the tumour. Mammary scirrhus has also been known to infect the elbow kept in contact with it.

Multiple villous papillomata of the bladder are common examples of the same process. (See also pp. 160, 184, &c.)

A large number of able investigators, from Scheuerlen to Ruffer, have laboriously sought for a special *microbe* in cancer,

on the hypothesis that the latter is produced by a micro-organism introduced from without. The uniform failure of these attempts must be held strong evidence in disproof of such an assumption. Further than this, it is to be noted that there are weighty *à priori* reasons for regarding the microbic hypothesis as highly improbable, and for placing cancer in a totally different category from maladies induced by an extraneous micro-organism.

Diseases in which the presence of a micro-parasite has been proved were, long before the actual demonstration of such microbe, distinguished by one of two phenomena: either there was evidence, or at the least strong suspicion, of a contagious element; or a large number of individuals, exposed to certain conditions of climate or soil, were simultaneously affected. Of the former class, leprosy and tuberculosis form the most prominent types; though occasionally the contagious character of the disorder was but fitfully displayed among civilised races, as with pneumonia; or was only shown when the microbe gained access to a fresh soil—as when measles attacked the Fiji islanders, or when other indigenous races underwent wholesale destruction by tuberculosis introduced by Europeans. (On this point see De Quatrefages, *The Human Race*.)

The second division of microbic disorders is exemplified by malarious complaints, in which there is no propagation by contact, but in which a large number of persons brought under the influence of a particular climatic environment suffer at the same time. In none of the maladies known as cancerous do we find anything corresponding, or even remotely analogous, to the preceding. No suspicion of propagation by contact exists; there is no relation to climate or soil; no considerable number of persons become a prey to cancer in any single place; even experimental inoculation from one animal to another is very rarely successful.

From these considerations, regarded in combination with the microscopic and clinical features which are seen to attend the progress of every cancerous malady, the conclusion follows that, in our present lights, cancer is not introduced from without, but is the product of agencies within; that no

microbic parasite is to be sought, but that the cell-elements of the body, under the influence of some mysterious force, themselves become autositcs. The *erosion phenomena* which attend the proliferation of the new parenchyma, combined with the *infectivity* of the malignant cell-elements, distinguish cancer from benign tumours, and from every other form of disease.*

Besides the theory given in the text, and that of an undiscovered microbe, the only other views of cancer-origin which have obtained a passing credence are Darwin's doctrine of pangenesis; and the inclusion-theory of Cohnheim. According to the former, minute spore-like bodies—not cells, but capable of eventually becoming such—were transmitted from parent to child, and gave birth in the end to a cancerous growth. Cohnheim, on the other hand, attributed malignant disease to the inclusion, during foetal life, of a small group of embryonic cells, which should normally have undergone transformation into organised tissue. The absence of a discernible congenital element in most instances, combined with that of any positive evidence, goes far to disprove these views so far as the great mass of cancerous disease is concerned. A certain small minority, however, undoubtedly arise from vestigial remains. (Appendix A.)

In respect of these special forms of cancer, and of these only, Cohnheim's theory holds good.

Dr. Charles Creighton (*Reports of Medical Officer to the Privy Council*, vol. vi. new series) attributes mammary new-growths to "various grades of the secretory force." For reasons why that opinion is inadmissible, see the *General Theory of Cancer-Formation*, p. 22.

No authentic instance of the transmission of cancer by contagion from one human being to another is on record. My note-books contain a memorandum of three instances, in which husband and wife have been thus attacked. In each there was an interval of several years between the respective outbreaks; and not only the organs involved, but also the pathological varieties of malignant growth, were totally distinct in every instance. The conspicuous prevalence of uterine cancer would necessarily involve frequent transmission to the opposite sex, were such an occurrence possible.

For an account of Messrs. Ballance and Shattock's very elaborate attempts to transfer cancer from man to the lower animals (monkeys,

* In the vegetable kingdom, the development of galls presents a certain amount of analogy to that of cancer; but the element of *infectivity* is wanting. See account of these by Dr. W. H. Ransome, "Address in Medicine": *Brit. Med. Journal*, July 30, 1892.

dogs, rabbits, rats, sheep, and cats), see the *Brit. Med. Journal*, March 14, 1889. All were uniformly failures, and in other hands successes, in proportion to the number of attempts made, have been most exceptional. Dr. Hanau, of Zurich, has inoculated a series of rats from one with a cancer on the vulva; and Eiselberg has also succeeded with two rats. Wehr and Nerinsky have transplanted carcinoma from dog to dog. These experiments, while proving the possibility of artificial transference, demonstrate also its extreme difficulty. They contrast with the relative frequency of an auto-inoculation process in the human subject.

For Dr. Armand Ruffer's most recent papers on so-called "parasitic protozoa" in cancer, see *Journal of Pathology and Bacteriology*, October 1892; *Brit. Med. Journal*, Nov. 5, 1892. There is no evidence in favour of the parasitic nature of the bodies therein described. Even under the microscope these betray no uniform susceptibility to any particular stain; no cultivation experiments have proved successful; sufficient allowance is hardly made for the normal multiplicity of cancer cell-nuclei. The appearances appear to be those of ordinary nuclear degeneration, long recognised. This explanation applies also to the "eosine bodies," described by Dr. W. Russell (*Brit. Med. Journal*, Dec. 13, 1890).

CHAPTER II.

THE PRIMARY LOCALISATION OF CANCER AND ITS SUBSEQUENT GENERALISATION.

THE reversion of cells to an autositic condition, which has been described as the "essence" of malignant disease, invariably takes place in a single small and limited tissue-area. No theoretical reason exists why the cancer-process should not occasionally take place simultaneously at different and distant parts of the body. All that can be said is that such an event has never yet been proved to occur. If two cancerous tumours are discovered, one is invariably consecutive to the other; the relative recency of the first being proved by comparative freedom from degeneration; and its mode of derivation usually distinctly traceable by an examination of the usual channels of infection. The same rule holds good, and usually in a more marked degree, with multiple tumour-formations. One is always conspicuously older than the rest, which bear towards it the resemblance of offspring to parent: among the former, various degrees of age can be made out; usually the older metastases are near, the newer more remote from the primary area of disease. This statement demands a reservation, which will be subsequently adverted to.

Carcinoma (commonly the familiar scirrhus cancer) of the female breast, is, in this respect, an efficient type of cancerous disease in general. We first find a very small nodular tumour at some part or other of the breast-parenchyma; this gradually increases in bulk. In a short time (usually of several weeks, occasionally of months), the infective phenomena of the disease commence. By means of the lymphatic channels, infective particles emanating from the affected cells are transferred to

the lymph-glands in the corresponding axilla; retained in which they develop at first insidiously, subsequently causing tenderness and enlargement of the organ. Subsequently to the axillary glands, those above the clavicle and within the thorax become affected.

Around the primary breast-tumour, other infection phenomena will by this time have probably arisen; generally in the subcutaneous tissue. Tiny nodules will have appeared in or under the skin, at a little distance from the scirrhus growth. These progressively increase in bulk; and are followed by others arranged in an ever-widening circle around the parent tumour.

Both breasts are never simultaneously attacked; if the second becomes diseased, this is always found to occur long subsequently to the developments in the first. Nor do we ever find several malignant deposits synchronously manifested at different portions of the same mamma; much less, other masses in distant parts of the body. The progressive distribution of the cancerous cells is always orderly, and strictly according to rule. Invariably, the lymph-glands in the adjoining axilla first betray infection; next, those above the clavicle; never *vice versâ*. Nor are the viscera affected until long after these organs. No caprice of distribution is seen throughout the earlier stages of this, or of any other cancer-species.

With Epithelioma of skin or mucous membranes, a species much more open to observation than mammary carcinoma, this local origin is still more evident. The chain of events is first the development of the primary lesion; then disease of the near lymph-glands; next, enlargement of the more distant; subsequently (though here only in exceptional cases) visceral metastases. The distal lymph-glands never betray infection before those near. The infection-path in every particular case is capable of prediction.

After a period, varying from weeks to that of years, of this orderly progress, a new state of things appears. We find evidence, sometimes positive, as when a cancerous mass has been found projecting into the lumen of a blood-vessel—sometimes only circumstantial and inferential—that cancerous cell-particles have passed into the current of the general circulation.

With this event all regularity of diffusion ceases. Collections of malignant parenchyma are found growing anywhere in the body, it may be almost everywhere. No organ or tissue is wholly free from their inroads, but those suffer most whose vascularity is most conspicuous, and which are traversed by the largest amount of blood: such are the lungs and the liver, the most frequent seat (of all internal viscera) of secondary cancer-growths.

The stage of general blood infection is wanting in certain milder varieties of cancer, such as Rodent Ulcer. In the most severe it appears early: such as Periosteal Sarcomata, and Melanotic new growths of both classes. In the species indicated it is of constant occurrence sooner or later; in Epithelioma it is exceptional. The marrow-infection associated generally with the former (p. 66), contributes towards its super-vention.

Occasionally, the primary disease is not observed until extensive dissemination by the blood-current has already taken place. This is not uncommon with visceral Lympho-carcinomata, or with tumours arising from parts of the osseous skeleton inaccessible to observation. The marrow being specially favourable to the diffusion of cell-elements, very numerous cancer-masses are seen studding divers bones.

Such a condition, in which it has been found difficult or impossible to recognise the part whence these are derived, has been erroneously described as "primary general sarcomatosis."

The older view of cancer as a disease of "constitutional origin," whatever may be understood by that phrase, appears to have rested upon the phenomena of a single prominent variety, carcinoma of the female breast. The insidious manner in which that local species seemed to make its appearance; in which it so constantly "recurred" after seeming removal by operation; in which this "recurrence" occasionally became evident only after a considerable lapse of time; the occasional growth of an apparently independent tumour in the opposite mamma, were clinical features conferring thereon a peculiar obscurity. They were further countenanced by the occasional development of carcinoma, in two or more sisters, or in several

members of the same family. And the causes of the outbreak were less perfectly understood than now.

The insidious marrow-infection proved to take place in mammary carcinoma has dispelled much of the mystery hitherto involving the clinical course of that malady. The bone-marrow serves as a bed, in which the carcinoma-cells remain for months or years as "resting spores," eventually passing into the blood, and producing death with multiple metastases. Thus are to be explained the occasional long interval before "recurrence"; many cases of failure in cure by operation, some of disease in the opposite breast, &c. With disbelief in heredity as a factor in cancer-production, and with proof that if cancer sometimes attacks more than one person in the same family, it appears far more frequently when not the slightest evidence of inherited taint can be discovered; has vanished the authority of exceptional outbreaks in mother and daughter, or in sisters. Finally, ascription of the cell-proliferation to neurotic sources, and a recognition of the frequency with which this follows mental distress and anxiety, have largely dispelled obscurities of causation.

No other form of malignant growth lends the slightest countenance to the assumption of "constitutional" origin. The manifestations of the numerous cancer varieties are found always strictly local throughout the early period of their career; however modified in the later by blood-infection. All secondary tumours are referable to one of three agencies influencing the cell-constituents of the primary: transference by the lymph, dissemination by the blood, direct grafting (auto-inoculation).

A difficulty which here arises, is the reconciliation of what we note as a common clinical fact—the purely local character of all the early manifestations—with what is also a matter of every-day experience, the generation of carcinoma solely by distress of mind. We see the disorder commence as aforesaid in a single insignificant group of cells; we are compelled to refer this localised cell-aberration to general influences exerted through the central nervous system. On this point it can only be remarked that it is possible for us only to recognise the sequence; it is for a future generation to demonstrate how the

effect is brought about. The problem is incapable of ultimate solution until the relation of the nervous system to the cells concerned has been definitively worked out, at which goal, with existing methods of research, there is no present indication of our speedy arrival. All we know now is that the sexual organs of woman have a peculiarly intimate association with the central nervous system, and are delicately influenced in very diverse ways by mental emotion; in the second place, that depressing mental states are the most common immediate antecedents of cancer in these parts; lastly, that the sequence here is almost wholly limited to the period of involution.

The most useful type of the cancer-process in general is Epithelioma, which is nearly always *ab initio* open to observation; which owns a direct cause (local friction); which rarely gives rise to any question of inherited tendencies. Attentively studied, this least obscure form presents an epitome or microcosm of almost all cancer phenomena.

For a discussion of the relations of the female sexual organs to the nervous system, see *The Proclivity of Women to Cancer* (Messrs. Churchill, 1891). With this is reprinted an analysis of the belief in heredity as a cancer-factor; with the grounds for the rejection of that opinion. A short table of the various neurotic sources of cancer is printed at the end of *The Reappearance of Cancer after Apparent Extirpation*. On the effect of mental trouble, see "The Increase of Cancer: its Probable Cause": *The Nineteenth Century*, July 1890.

Dissemination by the Blood: Resemblance of Metastases to Primary Tumour. The case narrated by Sir James Paget (*Surgical Pathology*, 1870, p. 823) is worth citing in this connection. In an instance of primary cancer of the liver, stained yellow by the bile, he found numerous masses of the same colour disseminated through the lungs. The small branches of the pulmonary arteries leading to these were filled with bright yellow substance, as if minutely injected with lead-chromate.

CHAPTER III.

CAUSES TO WHICH CANCER HAS BEEN ERRONEOUSLY ATTRIBUTED.

— HEREDITY. — THE GEOLOGICAL THEORY. — SUPPOSED INFLUENCE OF CLIMATE AND FOOD.

THE once universal ascription of cancer to an inherited predisposition appears to have principally rested, as has been already stated, on certain obscurities in the inception and course of mammary carcinomata. It was also favoured by ideas of "constitutional" origin; by popular tradition, unable otherwise to account for its seemingly mysterious appearance; by statistics, accumulated under the influence of a preconceived idea; and lastly, to a slight extent, by quasi-historical examples, such as that of the Buonaparte family.

It must, however, have been from the first obvious to the dispassionate inquirer that heredity could not possibly be a *vera causa*; it could not explain the inception of the disease, but only its transmission. Further researches, however, have demonstrated on numerous grounds the absence of valid reason for assuming that an ancestral predisposition has any influence whatever upon the development of cancerous disease. It is shown that the greater number of patients are unable to indicate any suggestion of inherited tendency; that even those who are supposed to have "cancer in the family," can only bring the vaguest possible evidence, most of which will not bear investigation; that each individual instance of a malignant growth owns its own direct excitant; that the mystery involving the physical manifestations of mammary carcinoma is in large measure explicable upon other grounds than that of "constitutional origin"; that even the minority who really have had a cancerous ancestor do not form a larger

percentage than is afforded by various classes of persons not afflicted with cancer, and so on.*

We cannot in the present day discover any grounds for holding that any one individual sets out in life with a greater liability to the development of cancer than any other. The like cause will always produce the like effect. Under due provocation all appear equally liable to suffer.† *In the genesis of cancer, no appreciable influence can be ascribed to heredity.*

Another so-called "predisposing cause" which demands cursory remark, is to be found in the "geological theory," whereof Mr. Alfred Haviland is the author (*Geographical Distribution of Cancer in Females*, 1875). By this, it is sought to establish a causal relationship between the development of cancerous disease (in women) and certain conditions of soil and climate. Malignant neoplasms are stated to be most abundant in vales by the sides of large rivers which periodically overflow their banks; conversely, the high dry sites on the older rocks are relatively free. In localities where the geological formation is alluvial and favourable to the retention and accumulation of moisture, a high mortality from malignant disease is said to prevail, whereas those counties whose area is occupied by hard and not easily disintegrated rocks, such as the silurian and carboniferous, in which, moreover, elevations of the surface are abundant, natural drainage is most efficient, and the drying influence of strong winds most sensibly felt, cancer does not thrive.

These assertions were based upon the Registrar-General's reports of the annual mortality from cancer during the twenty years' period, 1850-1870. They were founded solely upon these statistics, which involve very numerous sources of fallacy both in the actual records themselves, and in the interpretation to be placed thereon. They do not appear to have been supported by any clinical experience; and they lacked that essential preliminary step which must be taken before an

* For an exhaustive discussion on the question "Is cancer hereditary?" with sundry control-tests, see Appendix to *The Proclivity of Women to Cancer* (Churchill, 1891). Mr. H. Cripps (*Diseases of Rectum and Anus*, p. 92 et seq.) has some valuable remarks on the same subject.

† Cancer developments from vestigial remnants (Blastomata) are of course excepted.

argument merely numerical can be rationally advanced when the attempt is made to show causal relationship between two diverse series of phenomena. A real connection between the facts on each side must first of all be proved to exist.

A good many instances flatly 'controverting the supposed association of cancer (in women) with a damp soil were subsequently reported by an Investigation Committee of the British Medical Association, in the *British Medical Journal* of February 26, 1887. In the *Lancet* for August 11, 1890, Mr. Haviland further maintained his views; adding that the modern improvements in drainage had resulted in more sudden and more disastrous river floods; and thus accounting for the increased mortality from cancer in recent years. He instanced the towns of Worcester, Gloucester, Shrewsbury, Tewkesbury, Cheltenham and Stratford-on-Avon, as specially proving the truth of his geological theory; all showing a high cancer-mortality, and "all more or less subject to the periodical floods of the rivers Severn and Avon."

This question was then further tested by inquiries addressed to certain of the practitioners in most extensive practice at these towns.* All concurred in refusing to recognise any connection between dampness of soil and the development of cancer. None appeared to consider that this disease was more prevalent in their neighbourhoods than elsewhere; any preponderance in the mortality-returns being plausibly accounted for by the natural gravitation of patients from adjoining counties to the local infirmary. Several of these gentlemen remarked that the towns in which they resided were singularly free from river floods, and that the locality was well-drained.

The climatic influences brought under notice in the *brochure* referred to cannot then be credited with any relationship to malignant disease. There is no evidence that the inhabitants of hot climates are more liable than those of cold, of moist regions than of dry, of elevated than of low.

On the effect of diet, peculiar rumours have occasionally obtained currency. In particular that very wholesome fruit, the *tomato*, has obtained an ill-reputation; on what grounds it

* See *Lancet*, Nov. 22, 1890: "The Geological Theory of Cancer Origin."

is extremely difficult to discover. Vegetarians have also been credited with special immunity from cancer. Neither of these statements has the slightest discoverable foundation. There can be no doubt, that ingesta which lead to a morbid state of the lining membrane of the alimentary canal, are not without effect in paving the way for malignant developments in the epithelium. The coated tongue seen to follow the administration of *alcohol*, is but an indication of unhealthy changes in the epithelium lining the upper half of the digestive tract; preventing repair from slight injuries, and thus apt to generate Epithelioma. Similarly, though direct evidence of the fact is wanting, agricultural labourers are said to suffer from cancer in the stomach, as a result of their excessive use of *mustard*. Such agencies have no bearing upon the genesis of cancer in any other region than the digestive tract: and contribute only in a very minor degree to the sum-total of malignant cases.

CHAPTER IV.

RELATION OF CANCER TO CIVILISATION.—ITS RECENT INCREASE.

WE unfortunately possess very little reliable information concerning the diseases prevalent among races lower in the scale of civilisation than our own; and materials for a comparative analysis of the maladies which characterise man under varying social and climatic conditions are almost absolutely wanting. In respect, however, of cancer, all the travellers who have noticed the point, appear to concur in the statement that among savage peoples the disease is rare, or even entirely absent.

Dr. Walshe says that the maximum amount of cancerous disease occurs in Europe. It is very rare among the natives of Egypt, Algiers, Senegal, Arabia, and the tropical parts of America; and is seldom seen among the patients of the hospitals at Hobart Town and Calcutta.

Dr. Livingstone (*Missionary Travels in South Africa*, 1857, p. 127), remarks that cancer is quite unknown among the Bakwains; although fatty and fibrous tumours are prevalent.

Dr. L. Young (*Anatomy of the Breast*, by Sir Astley Cooper, 1840) observes that among the negresses in the West Indies: "Malignant diseases of the uterus and mammæ are of very rare occurrence; and even those cases which I have witnessed in this class of people, have been among the better orders of them, whose habits of living have been assimilated to those of the Europeans."

On the other hand, "the course and ravages of the

disease are the same among the Chinese as ourselves " (Walshe).*

While we thus find that malignant diseases are almost entirely an attribute of the civilised state, we are also confronted by the fact that among those nations which pre-eminently march in the van of evolutionary social progress, cancer is, without doubt, alarmingly on the increase.

The following table, extracted from the Registrar-General's returns, shows the aggregate mortality from diseases of this class in England and Wales since the year 1864 :

Year.	Male.	Female.	Total Deaths from Cancer.	Year.	Male.	Female.	Total Deaths from Cancer.
1864	2,459	5,658	8,117	1878	4,207	8,457	12,664
1865	2,389	5,533	7,922	1879	4,183	8,616	12,799
1866	2,532	5,761	8,293	1880	4,461	8,817	13,278
1867	2,650	5,895	8,545	1881	4,611	8,931	13,542
1868	2,743	6,137	8,880	1882	4,685	9,372	14,057
1869	2,933	6,381	9,314	1883	4,967	9,647	14,614
1870	2,971	6,627	9,598	1884	5,346	9,852	15,198
1871	3,060	6,631	9,691	1885	5,195	10,065	15,260
1872	3,228	6,765	9,993	1886	5,754	10,489	16,243
1873	3,387	7,118	10,505	1887	6,262	10,851	17,113
1874	3,470	7,541	11,011	1888	6,284	11,222	17,506
1875	3,648	7,766	11,414	1889	6,891	11,763	18,654
1876	3,747	7,852	11,599	1890	7,137	12,290	19,433
1877	3,988	8,134	12,122				

It might naturally be objected that this large increase is to be accounted for by augmented population during the same period. That deaths from the cause in question have become relatively, as well as numerically, more frequent is, however, shown by the following computation given on the same authority; the population having progressed from 20,883,889 in 1864 to 28,762,287 in 1890; (males 13,939,577 : females 14,822,710).

* Hardly anything seems to have been done towards ascertaining the racial or geographical distribution of cancer since the days of Dr. Walshe. Works of travel only very rarely contain a passing reference to the prevalence of other complaints. A work on comparative ethnology, in its pathological aspects, is greatly needed.

The popular notion that JEWS are relatively free from cancer, is emphatically contradicted by medical men specially practising among them.

CANCER AND CIVILISATION.

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Ratio of Annual Death-rate from Cancer to 1,000,000 persons living : through period 1864-1890.

Year.	Ratio.	Year.	Ratio.	Year.	Ratio.	Year.	Ratio.
1864	385	1871	423	1878	503	1885	572
1865	372	1872	429	1879	501	1886	590
1866	385	1873	444	1880	512	1887	615
1867	392	1874	461	1881	520	1888	631
1868	401	1875	471	1882	534	1889	656
1869	417	1876	471	1883	549	1890	676
1870	424	1877	488	1884	563		

In Ireland, the total population in 1864 amounted to 5,675,307 ; among whom the deaths from cancer are stated to have been 1498 (males 664, females 834). In 1884 (taking a period of twenty years for the comparison), the population had decreased to 4,962,693 ; while the mortality from cancer had increased to 1947 (males 836, females 1111).

In Scotland the population in 1864 was returned as 3,118,701 ; from among whom cancerous maladies had claimed 1300 victims (males 379, females 921). In 1884 it had increased to 4,962,693 ; and the cancer-mortality had advanced to 2110 (males 789, females 1321).

Dr. Fordyce Barker states that, in New York, the proportion of deaths from the above cause, to a million persons living, was in 1875, 400 ; in 1885, 530.

In the mortality-returns of the Registrar-General, "Lupus" (mainly a tubercular disease) is included in the class of cancer. The statistics are wholly founded upon medical death-certificates, which state the cause of death only "to the best of my knowledge and belief," and very rarely upon an autopsy. Hence when the patient's decease has resulted from maladies of the internal viscera, as well as under some other circumstances, it is impossible to accept these certificates as trustworthy statements of fact, and as affording an unimpeachable basis for deductive argument.*

* See forcible remarks to this effect, by the Registrar-General, in Report for 1889.

With every qualification, however, that can well be demanded, including the improvements in diagnosis which are asserted to have taken place in recent years, and which have therefore been advanced in explanation of the augmented mortality; there can be no doubt that malignant diseases are really becoming far more prevalent than formerly. The steadily progressive increase, year by year, in the mortality—returns—which, it may be remarked, refer to the fatal cases only and omit reference to those in which life has been saved by timely interference—demonstrates beyond question that the phenomenon is real, and not merely apparent. Such annual increments witnessed throughout so long a period of time cannot be accounted for by the acquirements of medical science, during the years here in question.

According to the Registrar-General (Report for 1889): "The figures show, in the first place, that though cancers or new-growths are vastly more common among women than among men, yet this excess is entirely due to the great liability of the female generative organs and breast to be thus affected; and that when these organs, and those which are specially likely to be secondarily affected from them—(or, in the absence of a post-mortem examination, to be confounded with them)—are excluded; the excess (*i.e.*, in the annual increment) is invariably on the side of the male sex."*

Certain kinds of malignant disease are found among the lower animals, but apparently not with much frequency, mechanical injury being usually the cause. The published records, however, are rather meagre, and the exact pathological condition not always satisfactorily demonstrated. Williams (*Veterinary Surgery*, 1884, p. 247) states that *epithelioma* is

* It is difficult to see the point of this statement. The rope naturally yields at its weakest part. Compare the figures on preceding page; and see Chapters VII. and VIII. My paper above referred to on "Cancer in its Relations to Insanity," read at the Bournemouth meeting of the Brit. Med. Association, went to prove the rather curious facts: (a) That malignant disease is rare among the insane, and seems wholly absent in idiots and imbeciles; (b) That the inmates of asylums present a marked exception to the statistics of progressive cancer-mortality among the outside world in recent years, and that cancer is not becoming in the slightest degree more appreciably frequent among them.

very rare ; that it follows some local injury, and is relatively most common in dogs. He speaks of *lympho-sarcoma* as occurring "in all the patients of the veterinary surgeon." Old horses and ponies suffer from melanotic growths ; whether malignant, is not apparent. The subject of cancer in the lower animals has hardly yet received the attention it deserves. The domesticated are stated to be more subject to cancer than the *feræ naturæ* ; that assertion would be difficult to prove absolutely, and would, moreover, be valid in respect of almost all other disease processes. Many growths in these creatures once thought to be cancerous, are now referable to a micro-organism ; as, for example, Actino-mycosis.

CHAPTER V.

THE RELATIVE PREVALENCE OF CANCER IN THE TWO SEXES.—
PROCLIVITY OF CERTAIN ORGANS AND COMPARATIVE EXEMPTION OF OTHERS.

THE statistical tables cited in the preceding chapter demonstrate an enormous inequality, in relative liability to cancer, between the sexes. The proportion of males to females in the entire population of England and Wales is stated by the Registrar-General to be as nearly as possible 100 of the former to 105 of the latter; in that of London alone, the ratio is as 100 to 114. Comparing the numbers in the above lists, and allowing for this slight inequality, the aggregate of women-sufferers appears to be about double that of men.

It need hardly be said that this melancholy pre-eminence on the part of woman is due to the frequency with which cancer makes its appearance in her special sexual organs, the breasts and uterus. It is, however, by no means a universal law, holding good for every tissue or organ; from some very painful and common forms of cancer women are peculiarly free.

Of 476 females treated at the Cancer Hospital in the year 1889, as in-patients, 115 suffered from malignant disease of the Breast, exactly the same number from that of the Uterus: *these two sexual organs therefore filling nearly half the field.* Of 203 males, only four suffered from cancer of the Genitals; with this may be contrasted a record of six cases of Epithelioma of the Vulva.

Two women-patients had malignant disease of the Tongue, one ditto on the Lips, none on the Mouth and Fauces. Among the men on the other hand, we find twenty attacked

by Tongue-Epithelioma, fourteen by the same in other parts of the Mouth or Pharynx, eleven by Epithelioma on the Lips, three by cancerous disease of the Tonsils.

While seven males were attacked by Epithelioma in the skin of the Face, only one woman suffered thus ; whereas six men had the same on the external Ear, the record is blank on the female side ; one patient only (male) was treated for Rodent Ulcer commencing in the lower Eyelid.

It is therefore evident that women are remarkably *exempt* from cancerous disease of the Tongue, Lips, Buccal mucous membrane generally, skin of Face and Ears.

When, however, we pass to other regions of the body, there appears to be almost a *parity between males and females* in respect of liability to cancerous developments. Eleven women, seven men, suffered from Cylindroma of the Rectum ; ten women, six men from disease of the Abdominal Viscera ; five women, four men from miscellaneous cancerous maladies of the Extremities ; and, as we have seen, the external Generative Organs in both sexes are pretty much on a par. In fact, making allowance for the slight preponderance of women in the population generally, we are justified in assuming an *absolute equality* between males and females, in respect of all the parts last indicated.

Corresponding statistics from other sources may be collated. The first were computed by Mr. Sibley from the records of the Middlesex Hospital, and refer to a total of 520 cases, 105 male, 415 female ; a part only of the table (published in the *Medico-Chirurgical Transactions*, 42, 1859) is here given :

Organ.	Male.	Female	Organ.	Male.	Female.
Lip, mouth, &c. . . .	27	3	Penis and scrotum . .	8	—
Tongue	9	5	Anus	4	1
Tonsil, palate, parotid. &c.	5	1	Bones	9	6
Stomach and intes- tines	9	5	Lungs, liver, kidneys, lymphatic system, thyroid body	5	5
Rectum	4	7	Œsophagus	2	1
Nose, face, scalp . .	10	9	Breast	1	191
Skin elsewhere . . .	5	5	Uterus	—	156
Clitoris and labia . .	—	13			

The following table is taken from the *Medico-Chirurgical Transactions* for 1862 (45); and was drawn up by Mr. Marrant Baker from notes of 500 cases seen by Sir James Paget:

Organ.	Male.	Female.	Organ.	Male.	Female.
Lips and cheeks . . .	25	4	Integuments of scalp . . .	1	1
Tongue . . .	10	11	Integuments of nose . . .	8	1
Gums and palate . . .	6	3	and face . . .		
Rectum . . .	8	3	Lymphatic glands . . .	10	6
Integument of limbs . . .			Œsophagus . . .	2	5
and trunk . . .	13	5	Breast . . .	7	269

Uterine cases are not included in this report.

These figures corroborate the preceding in testimony to the fatal ascendancy of the Breasts and Uterus in this department of disease; and in displaying the striking exemption above alluded to. It is further observable that there is a species of *neutral ground*, parts in which cancer attacks male and female with equal, or nearly equal, frequency. Such are the lower part of the Alimentary Tract, and the Internal Viscera.

While the Rectum and Intestines in both sexes appear equally prone to malignant disease, the Stomach and Œsophagus of men more often suffer than the corresponding organs in women. There is not, however, such a striking disproportion as when the Buccal cavity is in question; and these parts seem to occupy an intermediate position.

Primary Cancer of the Stomach.

Total Cases.	Male.	Female.	Observer.
2214	1233	981	Dr. Welch (of New York).
1303	680	623	Dr. Wilson Fox.
223	151	72	Dr. Brinton.
79	52	22	Dr. Habershon.
3819	2116	1698	

Mr. F. B. Jessett (*Cancer of the Alimentary Tract*) quotes thirty-five cases of primary cancer of the œsophagus and

pharynx. Of these, twenty-five occurred in the male, ten in the female.

On the other hand, the same surgeon refers to forty-two cases of rectal malignant disease; whereof twenty were in men, twenty-two in women. Also to 104 of primarily cancerous intestines (excluding the rectum); forty-six appeared in the male, fifty-eight in the female.*

Besides their conspicuous liability to malignant disease of the Face, Tongue, and Buccal tract generally, men, as indicated by these statistics, are much more prone than women to cancer of the Bones (see p. 305); of the Lymph-glands (p. 337); of the Bladder (p. 309); of the Larynx (p. 282). In the Eyeball (p. 326), they exhibit a slight numerical superiority over the opposite sex. Malignant disease of the male breast is singularly exceptional (p. 212).

* In his well-known work, Dr. Walshe, dealing with 9118 cases drawn from the Mortality records of Paris, inserts a record of 2303 deaths from cancer of the stomach, against 2996 from that of the uterus, and 1147 of mammary cancer. Malignant disease of the stomach is, among us, rather uncommon; and it is impossible to accept a statement which imputes to it such an extraordinary prevalence. Should it be sought to compare the relative frequency among the total population of the various cancer-species, excluding reference to the particular organ attacked, I know of no data on which, for such a purpose, the smallest reliance can be placed. Nearly all figures bearing upon questions of pathology must at present be received with the utmost caution.

CHAPTER VI.

CLASSIFICATION.

THE following classification of the cancers seems best to accord with their various sources and natural affinities. It is needless to add that many etiological points are still obscure, and that this arrangement is no more than provisional and tentative.

The primary varieties of cancer are nine :

I. EPITHELIOMA.

Derived from the epithelial cells of the epidermis, or of the mucous membranes, whether squamous, columnar, or transitional.

II. CARCINOMA.

Derived from the epithelioid cells of acinar secreting glands.

Sub-varieties (in the mamma only).

(a) Scirrhus or chronic carcinoma.

(b) Encephaloid or acute carcinoma.

III. SARCOMA.

Generated by the cells or corpuscles of the connective-tissues.

Sub-varieties.

Spindle-celled sarcoma.

Mixed-celled sarcoma.

Glioma.

The spindle-sarcoma further presents two modifications of structure known respectively as Myeloid and Alveolar sarcoma.

IV. LYMPHO-CARCINOMA.

Derived from the cells of the various lymphoid-tissues ; principally from those contained in the lymph-glands.

V. CYLINDROMA.

Derived from the cells of tubular gland-follicles, and histologically constituting an aberrant reproduction of tubular gland-structure. Practically a variant of Epithelioma.

VI. RODENT ULCER.

A cancerous reproduction of hair-follicle structures originating in the cells of the outer root-sheath ; also a modification of Epithelioma.

VII. ENDOTHELIOMA.

Generated by endothelial cell-plates. A rare and obscure form of cancer.

VIII. MYO-SARCOMA.

Springing from the nuclei of organic muscle-fibre.

IX. BLASTOMA.

The cancer of vestigial residua. See Appendix A.

These may be regarded as *genera* ; *species* arise by modifications in the structure of the former, sometimes degenerative, sometimes in the direction of higher organisation. Such are the tumours termed :

Colloid carcinoma.

Melanotic cancer, both epithelial and of connective-tissue origin.

Osteoid sarcoma.

Myxoma.

Chloroma.

There further remain to be considered certain ill-understood and rare cancer-developments, with tumours which lie on the borderland of cancer, and only occasionally display malignant features :

Thyroid cancer.

The plexiform sarcoma of Billroth (probably an Endothelioma).

Kaposi's disease (Xeroderma pigmentosum).

Granuloma Fungoides or Dühring's Neoplasm.

Cheloid.

Intra-cystic vegetations (of two species, carcinomatous and sarcomatous).

Fibroma Molluscum (exceptionally a cancerous growth).

Rhabdo-myoma (ranking properly with Blastoma).

Psammoma (believed to be a product of endothelium).

In the preceding, no reference is made to the embryonic "blasts." These terms used in relation to cancer presuppose a congenital origin. Hence they are valid only in the case of the exceptional forms, derived from vestigial remnants; on average malignant disease, they have no bearing whatever. Supposed association of cancer with the folds of the embryo has involved a somewhat arbitrary nosology; as when endotheliomata are ranked with the malignant products of the connective tissues, by reason of the common meso-blastic origin of these structures, and endothelium.

All the maladies included in the above nine chief sections conform in varying degree to the essential features of "cancer," as detailed in Chapter I. *All further are distinguished from diseases owning a parasitic or microbic source by their quality of "breeding true"—i.e., the secondary deposits reproduce the structural arrangement of the parent-tissue.* (See remark at p. 161.)

The phenomena of the tumours here grouped in "Blastoma" indicate the *reversionary* character of the cancer-process throughout the various cell-species.

CHAPTER VII.

CAUSATION.

THAT "abnormal cell-proliferation which constitutes cancer" takes place only under the influence of an initial force or stimulus, applied directly or indirectly to the particular cells concerned. (See address introductory to series of annual lectures at the Cancer Hospital, "What is Malignancy?" *Lancet*, Oct. 16th and 23rd, 1886). Except in the small class of malignant growths due to included vestigial remnants, malignant disease never arises spontaneously, as though by the operation of some inherent evolutionary tendency. The nature of this stimulus can nearly always be ascertained in every particular instance; the cause of a malignant tumour is, as a rule, far less obscure than is that of a benign new-growth. The exciting factors of each principal variety will be now pointed out.

As each cancer springs from a different cell variety, so the initial force required to generate the disease in the respective tissues ordinarily varies in form and in manner of application.

Epithelioma (Epithelial Cancer) is due to long-continued friction directly applied to the epithelium or epidermis. *Rodent Ulcer*, and *Cylindroma*, derived from slightly modified epithelium, own a similar exciting cause.

Carcinoma, taking that of the Mammæ as a type, arises in 11.5 per cent. of the cases, from sudden and single acts of violence; thus leaving 88.5 per cent. to be otherwise accounted for.

Sarcomata follow sudden injury to connective tissue, sometimes a blow, sometimes a strain or sprain; and the cancers of the lymphoid tissues (*Lympho-carcinomata*) own usually a like history.

Thus the *traumatic* development of malignant disease follows mechanical injury in two different guises—sudden violence, and long-continued irritation. The above statements exemplify only the average rule, to which, with every variety, there are exceptions. Thus, cancers usually consequent upon continued friction are occasionally found to follow a single contusion; those ordinarily due to the latter may result from the former agency. Epithelioma may be generated by a blow; mammary Carcinoma, in a small percentage of cases, ensues upon long-sustained irritation or ulceration of the nipple; Sarcoma and Lympho-carcinoma may apparently be produced, not by a solitary fall or sprain, but by laborious occupations, such as those which involve the habitual carrying of a ponderous weight. Nay, when the skin happens to be attacked by lesions of the former class, some cases may be plausibly attributed to friction or undue pressure by articles of clothing. A certain degree of etiological unity is thus attributable to all those cancers generated by direct traumatism.*

The cancer species whose origin is most enveloped in mystery is the most prevalent of all—Carcinoma. To this class belong the great bulk of cancers in the breast and uterus, with many in visceral organs, commonly reported as sarcomata. It is to be noted that these structures are for the most part fairly protected from mechanical violence; that in the most exposed, the *mammæ*, traumatism accounts for only a small minority of the cases. The Cancer Hospital records, based upon 8998 instances, refer 11.5 per cent. to injury; Dr. Samuel Gross, 11.7 per cent.; Sir James Paget, the rather larger proportion of 17.57 per cent. In the great majority, the operation of traumatism can be completely excluded.

On the theory of cancer genesis set forth above, it is

* With such lesions as epithelioma, the mode of causation is almost always perfectly evident. On the other hand, with such as the more chronic sarcomata, slowly growing for many years, the cause is often exceedingly obscure. The exciting sprain or contusion may have been of a trivial character, whereof all memory has quickly faded from the mind. The precise source can then only be inferred from analogy; and from the ascertained causation, history of similar cases.

On the generation of Epithelioma by special irritants, see p. 276.

manifest that two factors are concerned in the production of every malignant lesion :

- (a) The particular cells which undergo the malignant proliferation.
- (b) The nerve-centres, which ordinarily control these cells.

Now, if we consider the structure and the functional peculiarities of the breasts and uterus (which furnish by far the most examples of carcinoma in women—therefore of all carcinomata)—we find that these organs are, throughout the active period of their existence, more intimately associated with the nervous system than is any other part of the body. Their healthy vitality is consistent only with a perfectly healthy state of the nerve-centres; and their functions are profoundly modified by very slight derangements of the latter, particularly in connection with various shades of emotion.*

During the said period of functional activity, the above organs contain numerous cells which are being continually shed, and replaced by new ones; this change taking place at regular cyclic intervals, under the impulse of a regulating nerve-mechanism. Not until their prime is past, not until with advancing years involutionary modifications are instituted which ultimately abrogate their special functions, and bring about important alterations in their structure, do they betray this remarkable proclivity to cancer.

As therefore in only a small minority of instances are we able to assign the disease to a force directly acting upon the cells, we are logically compelled to refer the great majority to the second of the above elements, the nervous system, and to inquire if this large residuum may not own a *neurotic* origin.

On proceeding to verify our deduction by the test of clinical experience, we find that the number of instances in which malignant disease of the breasts and uterus follows immediately antecedent emotion, of a depressing character, is too large to be set down to chance; or to that general liability to the buffets of ill-fortune, which cancer-patients in their passage through life share with most other people not so afflicted.

* For illustrative details of the influence of the mind upon the milk-secretion, of the cell-changes which normally take place in both breasts and uterus at each menstrual period, see *The Proclivity of Women to Cancer*.

We further note that, when no previous trouble is ascertainable, the cancer-sufferer has been exposed to the influence of some other agency, also partaking of a neurotic character; for example, exhausting illness, or specially laborious toil.*

The influence of *mental distress* in generating mammary carcinoma was noted by many surgeons of old. Thus, Dr. Walshe (*On Cancer*, 1846, p. 155), says:

"Much has been written on the influence of mental misery, sudden reserves of fortune, and habitual gloominess of temper, on the deposition of carcinomatous matter. If systematic writers may be accredited, these constitute the most powerful cause of the disease. . . . It would be vain to deny that facts of a very convincing character, in respect of the agency of the mind in the production of this disease, are frequently observed. I have myself met with cases in which the connection appeared so clear and decisive that to question its reality would have seemed a struggle against reason."

Again, Sir James Paget (*Surgical Pathology*, 3rd edition, 1870, p. 800): "The cases are so frequent in which deep anxiety, deferred hope, and disappointment, are quickly followed by the growth or increase of cancer, that we can hardly doubt that mental depression is a weighty addition to the other influences that favour the development of the cancerous constitution. Nor is it strange that it should be so; it is consistent with the many other facts 'showing the affinity between cancer and depressed nutrition.'"

When we apply the experience of uterine and mammary carcinoma to the consideration of the more obscure visceral malignant disorders, a similar chain of events is ordinarily found to have preceded the outbreak. The sufferers of either sex are for the most part harassed-looking and broken down, old or well advanced in middle age. Though exceptions are met with, they generally give an account of trouble, severe and

* A table of such causes, as casually ascertained from twenty cases of miscellaneous malignant diseases, is printed in *The Reappearance of Cancer*. As is there remarked, the full significance of such conditions does not secure conviction, until cancer attacks the rich and well-to-do. If poorer patients only are considered, their validity is easily lost sight of.

Statistics.—Of 250 out- and in-patients at the Cancer Hospital, with cancer of the mammae or uterus, 43 gave histories permitting a suspicion of mechanical injury; 15 of these 43 also described themselves as having undergone much recent trouble: 32 others spoke of hard work and privation. In 156 there had been immediately antecedent trouble, often in very poignant form, as the loss of a near relative. In 19, no causation-history could be proved.

prolonged. Occasionally a traumatic cause is manifest, but even that is commonly conjoined with an account of depressing emotion, or of prolonged ill-health. Moreover, this association conspicuously obtains, not only with the particular section of cancers classed as carcinomata, but with malignant growths of the remaining species.

The conclusion is, that of all causes of the cancer-process in every shape, neurotic agencies are the most powerful. That of such, distress of mind is the one most commonly met with, exhausting toil and privation ranking next; that, of the most prevalent kinds, these are direct exciting causes; that they exert a weighty predisposing influence towards the development of the rest. Idiots and lunatics are remarkably exempt from cancer in every shape.

With that impairment of *general* vitality following the neurotic causes in question (and even in their absence, the necessary sequence of advancing age), must be duly recognised the "many other facts showing the affinity between cancer and depressed (*local*) nutrition" (Paget). Among such may be pointed out the unhealthy mucous membrane, which eventually is found the seat of Epithelioma; the coated tongue, so common in males, with the frequency of malignant developments in the upper half of the alimentary tract; the common supervention of the same upon old-standing syphilitic lesions. Uterine cancer often dates from parturition or miscarriage; specially in the absence of proper nursing, and with neglect of precautions to ensure the necessary rest.

Mammary new-growths are not seldom seen to commence near the scar of a former suppuration, and old cicatrices anywhere are prone to develop malignancy, if irritated. Lympho-carcinoma may begin in chronically enlarged lymph-glands. There is little doubt that pressure by the universal corset, directly on the breasts, indirectly on the pelvic organs, materially contributes to prepare the soil for future cancer in these regions. (See *The Proclivity of Women*, p. 37 *et seq*).

Of the exceptional group of cancers due to a reversion of persistent foetal structures, Rhabdo-myoma (*q.v.*) is the most prominent type. Such comply with Cohnheim's inclusion theory, appearing to become malignant by a natural devolu-

tionary process inherent in their structure, and not requiring the stimulus of an exciting cause. They are hence markedly differentiated from all the other species.

Cancer commonly generated by mental distress, &c., as the direct and sole exciting cause.	Cancer-varieties directly produced by mechanical agencies; but towards which depressing emotions appear to predispose.	Cancers in which the presence of no neurotic element has so far been ascertained.
Carcinoma.	Epithelioma, Sarcoma, Myo-Sarcoma, Lympho-Carcinoma, Cylindroma, Melanotic Cancer.	Glioma, Endothelioma, Rodent Ulcer, Mixed Sarcomata of Embryonic origin, Rhabdo-Myoma, Thyroid Cancer, with the remaining obscure forms given at pp. 29, 30.

CHAPTER VIII.

REASONS FOR THE INCREASING PREVALENCE OF CANCER AND FOR RELATIVE EXEMPTION OR PROCLIVITY.

It has been pointed out that cancer is an attribute of the civilised state, rare or unknown among savages. Further, that those species which are found in the lower animals appear to be of the classes, such as epithelioma, induced by traumatism, and not, like carcinoma, of average neurotic origin. The Registrar-General's reports, and those quoted above from other sources, also show that malignant diseases become yearly more prevalent among civilised communities, in a degree out of all proportion to the increase of population in the same period; both sexes alike displaying a progressive annual increase.

While a minority of cancer cases are referable to traumatism in one form or another, the bulk are inexplicable on any such grounds. In the large and typical class of uterine and mammary carcinoma, neurotic antecedents, usually mental trouble, are found to be the immediate precursors of the disease. In a considerable number of other cancer cases of every pathological variety, there is a similar history; in conjunction with the presence of the exciting cause proper to the species.

The development of cancer in the civilised state may therefore be plausibly referred to the augmented wear and tear which life in such communities involves. The alarming increase of late in cancer mortality is hardly explicable upon any other grounds than those of the increasing severity of the struggle for existence. With this as the principal cause, the effect of certain minor factors must also be taken into consideration.

As depressing emotions and analogous conditions of the nervous system figure as the main generators of cancer, considered from a numerical standpoint, so woman, the physically less robust, and by far the more emotional of the two sexes, is exhibited in the Registrar-General's tables as the principal sufferer.

The organs which contribute most towards this conspicuous preponderance are the uterus and mammæ. (See statistics at pp. 24, 25.) The close subordination in health of these parts to the nervous system and the unstable equilibrium of their numerous cell-elements, have been already referred to. The relation of such conditions to cancer-production will be found discussed in detail in my *Proclivity of Women to Cancer*. The variety mainly in question is carcinoma. To cancer of the external generative region (chiefly epithelial), men and women seem equally liable.

On the other hand, *females* are remarkably exempt from cancer of the mouth, tongue, lips, skin of face, and ears. Of the 415 Middlesex Hospital cases referred to, only eight were instances of disease in the three parts first mentioned. Of 398 by Sir James Paget, these were attacked in 15* (against 269 mammary). Of the 476 Cancer Hospital cases, three were here diseased.

Turning to the opposite sex, we find *men* peculiarly liable to malignant affections of these very parts. Of 105 Middlesex Hospital cases of miscellaneous cancer, 36 began in the lip, mouth, or tongue. Of 99 by Sir James Paget, 44 were located in these. Of 203 at the Cancer Hospital, 20 men suffered from tongue-cancer, 11 from ditto on the lips, 14 from the same elsewhere in the mouth or pharynx, 3 from malignant growths on the tonsil. Further, 7 out of these 203 had cancer on the skin of the face (against 1 female); 6, on the external ear (no woman thus affected).

The pathological species here almost solely concerned is Epithelioma, which always owns a mechanical cause, and which is predisposed to by an unhealthy condition of mucous membrane or skin. The exemption of women in this region is to

* *Med.-Chirurg. Trans.*, xlv.

be explained, partly by their greater attention to cleanliness, and to their personal appearance in general; partly, by comparative abstinence from alcohol, and from tobacco. Conversely, the proclivity of men can be accounted for by their indulgence in habits which produce a disordered mucous membrane—*e.g.*, alcoholism, smoking, syphilis. In the second place, by their comparative neglect of such conditions as prove the ordinary forerunners of epithelial cancer; such as sharply projecting or decaying teeth, warty growths, &c.

There is reason to believe that alcohol, particularly in the form of spirits, is the principal cause of this special male predominance. The furred tongue produced by even a moderate dose of some spirituous liquor, affords presumptive evidence. The disparity between men and women is conspicuously exhibited by the mucous tract most exposed to direct contact with alcohol, the mouth, tongue, and lips. In the œsophagus and stomach this is still present, but in a much smaller degree; whereas below the latter, the alimentary canal no longer brought in contact with the liquid ingesta, seems equally liable in both the sexes. Drunkards often suffer, teetotalers seldom.

The figures at pp. 26, 27, exhibit twice as many men treated for cancer of the pharynx and œsophagus as women. In the stomach, there is a striking preponderance of cancerous males. In the remainder of the alimentary canal, the numbers are nearly equal; and when allowance is made for the majority of females in the population, correspond still more closely.

When we pass to malignant lesions of the body in other parts than those already considered, we either find both sexes pretty much on a par; or else we only see such a relative inequality as may be readily accounted for by reference to the average causation-rules of the particular species involved, or to the attributes of the organ attacked. Thus the greater liability of men to Sarcomata cannot well be due to any other source than the more laborious nature of their usual avocations, and greater exposure to casual blows or sprains; the ordinary excitants of that new-growth. The lymph-glands, bones, eyes of males, are comparatively prone to cancer, because men naturally receive more hard knocks than women. The male bladder suffers most in the same way, because of the prevalence

of prostatic troubles, with consequent irritation by residual urine; the male larynx by reason of alcoholic habits, climatic exposure, syphilisation, &c.; and so on, with the remaining forms.

The exemption of the liver and the lungs from primary cancer-growth markedly contrasts with the frequency of secondary deposits in these organs. The former is seldom attacked by malignant disease in any shape; malignant lung-tumours are almost unknown; many of the cases so reported in each instance were obviously metastatic. The discrepancy is most remarkable in respect of the liver, from its richness in secreting cells and high vascularity. The functional activity of the viscus, however, remains unimpaired until the end of life; there is no later period of involution, as in the female organs above cited; there is not known to be a cyclic desquamatic shedding of the cell-constituents, as certainly takes place in the uterus, and almost certainly in the breasts; there is no conspicuous subordination to nerve-influences. All visceral organs are, moreover, necessarily little exposed to traumatism.

The age-tables in Part III. show that cancer is emphatically a disease of the old, and of such as are past their prime. The special cancer-age in males may be approximatively stated as forty to sixty years; in females, it commences rather earlier, at *etat.* thirty-eight to sixty. It is commonly stated, and many statistics have been adduced to show, that after the age of sixty years there is a decline in comparative liability.

Several reasons combine to account for this development of cancer in middle and advanced middle age. Malignant diseases are particularly liable to attack organs which have past their period of usefulness to the organism, and are undergoing involution. Hence the cancerous-developments so numerous in the female sexual organs, after the age of thirty-eight; the same law is exemplified by the lympho-carcinomata which attack the degenerating thymus, as by the cancers of the vestigial remnant class. With this must be conjoined the multiplicity of cares which beset the old, with the loss of that youthful vitality which would otherwise counteract the depressing effects thereof.

The seemingly diminished prevalence in extreme old age

may be accounted for by: (*a*) The passive protected lives which old people lead: (*b*) The fact that the female organs which furnish the bulk of cancer-cases have completed their involution. But it may be doubted whether this assertion is perfectly accurate, and whether the tables printed in various well-known works are not liable to error. A large number of cancer-cases in the visceral organs of old people pass unrecognised; the deaths being attributed to some other cause;* and it may be questioned whether a certainly lowered proclivity to malignancy in the ordinary external sites may not really be compensated by increase in regions of the body more remote from observation.

A numerically small group of cancer-cases presents a conspicuous exception to the above age-rule. The cancer appears in infancy, or in early childhood; and, in some instances, is wholly limited to this period. It is found to commence in persistent foetal structures, which should normally have disappeared before birth. Rhabdo-myoma (p. 149) is the type of the class; its source being the remains of the Wolffian body. A similar source must be ascribed to some, if not to all, malignant growths in the bladder or testes of young children; and there is no other plausible means of accounting for the development of retinal Glioma (p. 125).

With the malignant tumours derived from vestigial remains (including, in addition to those cited, many or most parotid new-growths, anomalous masses in the pharynx, hinder part of the tongue, on the site of the obsolete foetal canals, some tumours of the pineal and pituitary bodies, &c.) may be bracketed the large mediastinal masses derived from the thymus, and appearing somewhat later in adolescence.

All these examples but further illustrate the law already stated, that an organ passing through involutionary modifications is pre-eminently liable to the cancer-process.

* Such vague terms as "gastritis," "enteritis," "inflammation of the bowels," may be adduced as probably covering many of the above, in death-certificates.

The numerical diminution in the later decades, apparent in any statistical table, must of course be checked by a consideration of the number of persons living at those ages.

Although scant statistics on the point have been hitherto adduced, and reliable materials for such are yet wanting, there is strong reason to believe that the *poor* are the special victims of cancer, the affluent being relatively exempt. That robust *physique* which enabled our forefathers to bear their burdens, and so conspicuously to defy the ordinary laws of health, has almost wholly vanished. In place of the sluggish animal existence which, diversified in one sex by violent muscular exercises, they mostly led, the prevalent characteristics of nineteenth-century life are ceaseless struggle and competition, perpetual anxiety and worry. These troubles bear with them the inseparable corollaries of bitter suffering and privation among the vanquished; they press most keenly on women. Cancerous diseases in general are but one among many signs of that severe stress upon the nervous system which modern civilised life involves; and of which the evil consequences are enhanced by the universal adoption of a vicious education-principle, mistaking quantity for quality.

CHAPTER IX.

RATIONALE OF THE MORE SALIENT CANCER-PHENOMENA.

I. *The varying "malignity" of Cancers.—Encapsulation.*

ALL the diseases classed as cancerous concur in displaying a steadily progressive tendency to cause the death of the individual. Even the seeming occasional pauses in the career of surface-lesions are rather apparent than real. But, as already stated, the most singular differences in this particular are witnessed in individual examples, of even the same pathological variety; for these, some of the reasons will now be considered.

This "progressive tendency" is resolvable into the combined operation of two forces: (*a*) The advance of the primary infiltration or tumour-formation: (*b*) The infectivity of the affected cells, and their liability to limit metastases. The second is by far the most significant.

Irrespective of the particular class of cell attacked, and consequently of the pathological species concerned, the rate of progress of primary cancer varies with:

- (*a*) The site.
- (*b*) The tissue-environment.
- (*c*) Differences of age; and in the textural peculiarities of the tissues of individuals.
- (*d*) The structure of the new-growth, particularly in respect of its vascularity, and of the ratio of new cell-elements to the normal tissues involved.
- (*e*) The capacity of the latter to undergo higher organisation.
- (*f*) Degeneration-phenomena.

Thus the most favourable *nidus* for local cancer-growth is furnished by an organ or tissue specially rich in cells, and possessing an active circulation. Of such, the liver may be regarded as a type; others are the marrow-tissue, the parenchyma of a lymph-gland, and the viscera. Conversely, a structure composed of tough fibrous tissue, with few cells and a scanty blood-supply, offers considerable resistance to the invasion of the malignant cells. Scar-tissue, or the shrivelled mammae of an aged woman, furnish examples. Under conditions of the former kind, the growth of cancer will almost certainly prove *acute*; under others of the latter character, a more *chronic* career may be confidently prognosticated.

Organised fibrous-tissue in any form offers considerable resistance to local tumour-growth—*e.g.*, cartilage, cicatricial tissue, tendons, fasciæ, “capsules.” There is a marked difference between the course of “intrinsic” and extrinsic laryngeal epithelioma (*q.v.*).

The different rate of increase of mammary carcinomata constitutes the most instructive exemplar of the contrasted states noted. Women always manifest a tendency greatly to understate the duration of such growths. Nevertheless, it is certain that some prove fatal within the twelve months (according to Paget, in four months), while others permit existence for thirty or forty years.*

The most *acute* cases of mammary carcinoma occur during pregnancy, the noticeable conditions being a highly developed organ with active circulation, and a comparatively early age of the individual. Conversely, the exceptionally chronic appear in women with atrophic breasts of the male type, which further have undergone their senile involution, and which hence consist of rigid fibrous tissue, with a very scanty modicum of cells.

The fibrous tissues vary very considerably in consistence at

* Patients' own statements on this point have always to be taken with much reserve. I have met with a case assigned by the woman a duration of thirty years, and there was no apparent reason to doubt her veracity. She was still hale and vigorous. I have encountered numerous others which have lasted fifteen to thirty years.

different periods of life, and even in different people of the same age. On these, the passive elements in each cancerous lesion, much depends. The breast of a young woman, should cancer exceptionally appear therein, yields quickly to the new cells, and furnishes an exuberant, quickly growing tumour. With the corresponding organ of one advanced in years, *vice versa*. Mammary cancer makes more rapid strides in the fat than in the spare and lean.

In the former, the fibrous "skeleton-framework" of the breast is succulent, easily torn; in the latter, tough and unyielding. Even in different regions of the mamma, the same phenomenon is exemplified; carcinoma beginning in or under the nipple is ordinarily more chronic than when the out-lying portions are the seat.

As the cell-proliferation advances, many of the cells decay; eventually the blood-supply is cut off from larger or smaller portions of the new-growth, through embolic plugging of the blood-vessels by cell masses in their lumen, partly also by extrinsic pressure. Ulceration, or even sphacelus, checks the increase in bulk of the growing mass, while leaving unimpaired the infectivity of its cell-elements.

A capacity to undergo higher organisation is a factor in cancer-development which does not, of course, concern the malignant product of pre-existing cells. It relates only to such as arise by a devolution-process in pre-formed tissue: *e.g.*, Sarcoma, Myo-sarcoma. Hence certain tumour-formations which lie on the borderland of cancer, and a part only of whose structure betrays malignant features under the microscope. Such are the slowly growing, recurring masses known as Chondro-sarcomata, the hypertrophy of scar-tissue termed Cheloid; many neoplasms of the connective-tissue series, which the microscope declares benign, while their repeated "recurrences" and fatality proclaim them to be cancers (see p. 133).

In the minority of instances, primary cancerous growths cause death by interference with the function of vital organs, such as the viscera; by obstructing natural processes of respiration, nutrition, or excretion; by repeated hæmorrhages, or continuous drain of blood-constituents; by secondary septicæmia from ulcerated surfaces; by exhaustion from the

suffering involved ; by induced inflammatory condition of the neighbouring parts, pneumonia, pleuritic or peritoneal effusions.

Much more often, however, the initial lesion contributes comparatively little towards the fatal result ; which is brought about almost entirely by the metastases. Dissemination of malignant cells is effected either by their direct entry into the current of the circulation, by the passage of cells, nuclei, or of minute fragments of nuclear protoplasm into that of the lymph ; or by the less common phenomenon of grafting (auto-inoculation). Transference by the lymph (considered in the following section) must ultimately involve infection of the blood.

Dissemination by the general circulation is promoted by exuberant cell-growth in the primary tumour, the cells being friable and easily detached ; also by hyperæmia of the bordering parts, or by proximity to large blood-vessels. The most rapidly fatal forms of cancer are those in which it occurs very early, as in the cases of "acute traumatic malignancy" (periosteal sarcoma), cited by Mr. Barwell (*Brit. Med. Journal*, Feb. 11, 1882). It is conspicuous with malignant tumours which gain ready access to the marrow, such as primary growths of bone, and mammary carcinoma. The causes of blood-infection appear to be wholly mechanical.

The vital endowments of the cell-derivatives of any particular cancer have a certain degree of influence upon its course. The diffusibility of pigmented cells, and the consequent malignity of the tumour which these originate, is illustrated by the two kinds of melanotic cancer. On the other hand, small epitheliomatous sores on the face or lips may run a remarkably chronic career, as contrasted with the same species elsewhere ; growing almost imperceptibly for several years.

When malignant disease occurs in milder forms—*i.e.*, when but a few cells are primarily attacked, and these under conditions unfavourable to their rapid growth—Nature appears to attempt the interposition of a barrier between the disease-area and the healthy parts around. The fibrous tissue immediately bordering on the former undergoes a certain degree of *hypertrophy*, the natural sequence of that hyperæmia

of the environment which characterises every malignant new-growth. Hence the quasi-capsulation of certain slowly advancing lesions—the hard, wrinkled, knotty mass presented by intestinal cylindromata, the puckered, contracted appearance of the most chronic scirrhus breast-tumours,

The various tissues of the body differ considerably, considered as vehicles of dissemination. The bone-marrow is in this respect particularly conspicuous; next ranks the sub-cutaneous connective-tissue. Owing to the rich plexus of lymphatics and blood-vessels present in the latter, secondary cancer deposits therein multiply with great rapidity, and the whole body may become studded with very numerous tumours, large and small. Examples of this occurrence in cancers of various kinds are to be found at pp. 105, 140, 180.*

Encapsulation.—Not infrequently a cancerous tumour-formation is found wholly enclosed by a fibrous sac, external to which the tissues are healthy. When complete, this condition may arise in two modes. In the first, the cells which are affected were previously enclosed in a fibrous membrane, as when a lymph-gland is primarily attacked. In the second, intra-cystic vegetations (malignant) have sprouted from the walls of an originally benign cyst. This is frequently seen in the breast and ovaries, less frequently in the thyroid body. Sometimes a small quantity of the original fluid contents yet remains; often under the persistent pressure of the new parenchyma, these latter have wholly disappeared.

In the case of intra-cystic vegetations, the cell-growth, sometimes carcinomatous, sometimes composed of connective-tissue, either organised or embryonic, may be regarded as taking place *on a free surface*, constituted by the interior of the cyst. The much more tardy lymph-gland infection shown by carcinomata, epitheliomata, and the like, developed under such conditions, than when they appear deeply within the tissues, was pointed out by Sir James Paget. (See also *Duct-Cancer*, p. 110).

The presence of a "capsule" inhibits cell-growth, and for the time contributes to localise the disease-process, so long

* For cases illustrating extremes of chronicity, or of acuteness in cancerous growths of identical species, see pp. 101, 129.

as it remains intact. In the end erosion takes place; when the surrounding tissues undergo the usual cancerous infiltration. When a cyst is the source, the capsule may either be easily peeled off the included parenchyma, or may adhere, more or less intimately, to the cell-contents.

An approximation is afforded by the "quasi-capsule" above alluded to; wherein inflammatory thickening of any fascia or fibrous tissue gradually compressed by a tumour of slow growth takes place. Malignant growths of the tonsil exemplify this condition, which partially checks local growth, but is necessarily less efficient in precluding distal infection than is the complete investment. The "quasi-capsule" is never free, but is always more or less blended with the cell-growth.

II. *Lymph-gland Infection.*

Like cancer-diffusion by the blood, infection of the lymphatic system appears to be effected by mechanical means. Minute portions of cell-protoplasm, some effete, some yet retaining vitality, are carried off by the usual channels to the nearest lymph-glands, where, in the meshes of the adenoid reticulum, they are arrested as by a filter. The still living fragments there continue to grow in an eminently favourable soil, composed of the lymphoid cells, which they gradually devour and replace.

Three stages of development in a lymph-gland may be conveniently formulated for practical purposes.

A stage of perfectly insidious cell-growth.

A second, of tenderness on pressure without enlargement.

A third, of increase in bulk.

The regular and orderly progression of infection from lymph-gland to lymph-gland has been already pointed out. It characterises the earlier stages of every malignant lesion which is associated with this physical condition.

In the later period, however, the dissemination phenomena, become extremely irregular, and lymph-glands wide of the normal diffusion-path, show tokens of disease. When the

cancerous cells in a gland have attained a certain stage of growth, the flow of lymph through it is completely obstructed, and the fluid has to pass into other channels, carrying with it the infective particles of protoplasm. The lymph-current flows in various abnormal directions, or even completely regurgitates, with the necessary result of cancer-deposit in glands primarily exempt. (See p. 70.)

The arrest of infective fragments in the proximal lymph-glands is an evident natural effort to restrain propagation. It, however, involves eventual passage into the current of the general circulation, with the corollary of distal metastases.

Lymph-gland affection, *per* the lymphatics, takes place earliest, becomes most marked, and exerts the greatest influence upon the duration of life, in Carcinoma and Epithelioma. Both in respect of the period at which the deposits occur, and of their subsequent career, marked variations are seen in different examples of each. As a rule, a cancer which infiltrates *ab initio*, speedily attacks the glands; one which sprouts exuberantly from a free surface, does this but slowly. An epithelioma on the tongue attacks the nearest glands within a few weeks; one on the skin of the face, or within the cavity of the bladder, or on the extremities, *may* not produce glandular enlargement for years. Cell-growth under inhibiting fasciæ or the like, very rapidly infects the glands; conversely, exuberant and unrestricted tumour-development, at a much later period. The hard scirrhus "kernel," appearing within a partially involuted breast, grows slowly, but is usually found to have attacked the axillary glands by the time the patient thinks of seeking medical advice. On the other hand, the acute "encephaloid" carcinomata of the same organ quickly attain a huge bulk, while the glands long remain small. In the former case, the diseased glands often enlarge more rapidly than the primary tumour; in the latter, they may give little or no trouble till the end.

The same general rule holds good with every other species. For example, malignant tumours of the tonsil, nearly always Lympho-Carcinomata, are much less prone to diffusion by the

lymph-glands than when one of the latter organs is the primary site of the same pathological variety.

Mere proximity of a cancer to lymph-glands counts for something. A scirrhus carcinoma at the outer edge of the mamma more speedily infects the axillary glands than one at the sternal edge.* Epithelioma on the feet or hands more gradually involves the lymph-organs in the groins or axilla than the like disease on tongue or lips implicates the sub-maxillary.

The marrow-infective phenomena of mammary carcinoma (p. 66) are referable to the agency of regurgitant lymph-currents.

Certain problems in connection with the topic under discussion present themselves, for which a satisfactory solution cannot at present be found. Thus, the malignant products of connective-tissue (sarcoma, myxoma) produce no secondary enlargement of the proximal lymph-glands, unless either :

- (a) There are concurrent phenomena of general blood-infection.
- (b) Or unless these organs are directly invaded by the primary growth.†

The second remarkable point is the rarity of blood-infection with visceral metastases, in epithelioma. With this, the exceptional occurrence of glandular enlargement in *Rodent Ulcer*, a sub-variety of the latter also derived from epithelial cells, may be noted.

It is impossible to suppose that in sarcomatous disease cell-particles do not enter the lymph-current precisely as they pass easily into that of the blood. When, however, these reach the lymph-glands, they must either have already lost their

* On this point the experience of the author is conspicuously at variance with that of the late Dr. S. Gross. (*Diseases of the Mammary Gland*, p. 158.)

† Seeming exceptions are produced by the vague application of the term "Sarcoma" to any cellular malignant growth whose precise tissue-origin is doubtful.

See the valuable list of bone-sarcomata in Mr. Butlin's *Sarcoma and Carcinoma*. A careful analysis of those which were assuredly derived from the periosteum, shows few exceptions, and these but of questionable authenticity, to the above law.

vitality, or must be forthwith destroyed, probably by a phagocytic action of the lymphoid cells.*

In epithelioma it may be assumed that *all* the particles are ordinarily retained in the gland-filter, so that none reach the blood-current. Visceral metastases due to blood-infection, however, are found in exceptional cases, and Mr. Godlee's case, at p. 243, appears to prove that when cell-germs are suffered to pass into the circulation, the usual consequences which accrue in other forms of cancer will follow. (See also p. 82.)

The rarity of secondary deposit in the glands near rodent ulcer can hardly be explained, except on the assumption of a phagocytic process within the adenoid reticulum.

These hypotheses need verification before they can be accepted as valid. Whatever the true explanation, the readiness with which a sarcoma infects the blood, yet spares the lymph-glands; with which an epithelial cancer attacks the latter, yet seldom affects the former, constitute two of the most remarkable phenomena in cancer-pathology.†

III. The "Recurrence" of Cancer.

The unfortunate word "recurrence" dates from the period at which the theory of "constitutional" origin obtained credence. It follows from what has been stated in the previous pages, that the phenomenon it denotes would be more correctly designated by "reappearance."

The renewed manifestations of cancer-growth, which may take place after the surgical removal of a malignant tumour, vary in the following manner. Supposing that portions of the tumour are confessedly left unremoved, the injuries inflicted by the surgical instruments employed will materially accelerate cell-proliferation. Commonly the wound does not heal, and an exuberant "fungous" excrescence quickly sprouts forth. The subsequent increase in bulk of the tumour proceeds much more rapidly than before, with concurrent exacerbation of all the

* A sarcoma may involve considerable modifications in the structure of the proximal lymph-glands, without actual metastases. (See case at p. 139.)

† Billroth's oft-quoted assertion, that the dissemination of sarcoma takes place by the veins, not by the lymphatics, may express a fact, but does not render this intelligible.

symptoms. Here the continuity of the cancer-developments from their primary inception is sufficiently obvious.

Under more favourable conditions for the patient, the entire tumour-formation palpable to sight and touch is excised. The wound heals, and a longer or shorter interval intervenes before any fresh manifestations of disease. Within a period usually limited to two years, but in acute examples very much shorter, fresh tumours make their appearance in or near the cicatrix, and slowly increase both in size and in number. The cell-growth, however, is hindered by the environing scar-tissue, and all the local manifestations are now relatively mild.

In such a case as this, the continuity of the progressive disease is more apt to be lost sight of. Although what seemed to be the whole disease-area has been extirpated, there can be no doubt, however, that the minute nodules which now appear are but collections of malignant cells or cell-nuclei derived from the primary lesion. By continuous multiplication these minute foci, generally included in the lymph-spaces of the tissues adjoining, have increased from microscopic dimensions to their present size. Doubtless a single nucleus is sometimes the foundation of what eventually becomes a large mass of cells.

The proof that "recurrent" cicatricial nodules are but the result of uneradicated cell-elements, derived from the primary cancer-parenchyma, is found in the results of individual operations. In proportion to the amount of seemingly healthy tissue surrounding a malignant tumour which is simultaneously removed, will be the number and importance of the reappearing "nodules." It is no unusual circumstance for the scar left by the obliteration of even the most acutely progressive cancer (*e.g.*, melanotic epithelial cancer of the integument) to remain permanently healthy.

The implication of certain normal structures by cancer is much more liable to involve future "recurrence" than is that of others. The rich plexus of lymphatics in the subcutaneous and submucous tissues conspicuously favours the propagation of infective particles. A malignant growth which adheres to the skin, is more prone to widespread dissemination *per* the subcutaneous tissue than one not brought in contact with

the lymphatics in this reign. The skin of the entire trunk may become studded with multiple secondary nodules, owning this method of propagation.

Every malignant neoplasm not invested by an inhibiting capsule, or which has eroded its fibrous envelope, is surrounded by a considerable area of tissue, not differing visibly from the healthy standard, but containing minute colonies of cancer-cells or nuclei, which, if left *in situ* at an operation, progressively enlarge. This infected region may be conveniently designated by the term "invisible zone." Provided, however, that union of the operation wound can be secured, the development of such residual foci is impeded by the cicatricial tissue which then envelops them; and they may not be discernible until one or two years have elapsed as tumour-formations.

Other forms of the so-called "recurrence" are exhibited by renewed manifestations of cancer-growth:

- (a) In the proximal lymph-glands;
- (b) In distant parts, particularly in visceral organs.

The mode of dissemination in the proximal lymph-glands has been already commented upon. The path always definitely coincides with that of the lymph-current, until there is a general blood-infection. Reappearance after operation in visceral organs signifies transference by the blood. The derivation of visceral metastases from the parent cancer is always capable of proof by microscopic evidence; most indisputable when the cells first attacked by the cancer-process possess some peculiarity of structure, such as pigment-granules, not normally found in those of the organ secondarily implicated (p. 14).

A remarkable part in the phenomena of "recurrent" cancer is played by the marrow of bones. (Section VIII.) A condition which seemed at one time inexplicable on any other grounds than the "constitutional origin" theory, is the development of carcinoma in both breasts. It is now found that from the mamma primarily attacked, infection commonly extends to the adjoining humerus and sternum; thence to more distant bones and viscera. Malignant cells which have passed into the marrow by lymphatic channels, therein

flourish without conspicuous symptoms for a term of months or even years, subsequently involving general blood-infection; and with this, disease of the opposite breast.

The female mammæ are never simultaneously attacked; the cancer-growth in one is always long posterior to that in the other. The manifestations of growth in the second are sometimes directly traceable to infection derived from the primary disease-area, *per* the subcutaneous lymphatics. A chain of nodules then stretches across the sternum from one (or from the place which that formerly occupied) to the other. In a case cited at p. 80 of my *Clinical Notes on Cancer*, the chain, instead of crossing the sternum, extended across the back. Failing this, the "sternal" and other symptoms of marrow-infection invariably coincide, and there are the usual physical signs of cancer-particles pervading the general circulation.*

IV. *Hardness, Puckering, and Contraction of Adjoining Tissue.*

The sensation of extreme hardness which most chronic, and some acute, forms of cancer present to the touch of the examiner, is rightly considered a very important element in cancer-diagnosis. It is necessary, however, to remember that this character may be merely apparent, that the actual density of the neoplasm very often by no means corresponds to what is felt by the hand; that when incised, it may be found soft and even pulpy.

An instance is furnished by lympho-carcinomata arising in the deep cervical glands under the tense fascia of the lower

*It has been asserted that the needle-punctures made in suturing an operation-wound are specially liable to reappearing nodules, and it has also been maintained that accidental inoculation may be effected in the course of an operation, by the knife. The first of these statements is decidedly erroneous; it holds good only when the incision passes through infiltrated tissue. Viewing the extreme difficulty in procuring purposive inoculation, it is difficult to attach credence to the second, although there can be no harm in taking precautions to avoid such a possibility.

An ingenious method of testing the tissues left behind after a breast-excision, for residual germs, has been promulgated by Mr. H. Stiles. A small fragment of the seemingly healthy parts is immersed for a few minutes in a five per cent. solution of nitric acid; the connective structures swell, the epithelial become white and opaque. It unfortunately prolongs the operation and cannot be credited with any real practical value.

regions of the neck. They seem to be of the consistence of bone, and are easily mistaken for vertebral exostoses. When cut into, they present the usual rather soft parenchyma of that cancer-species. The stony hardness of carcinoma of the testis, before ulceration, is another case in point.

The deceptive sensations which these and similar tumours present, are produced by a tense mass of cells enclosed in a rigid envelope of fibrous tissue; or growing under dense resisting fascia. If the seeming hardness of a scirrhus growth be attributed to the fibrous tissue this contains, it may be useful to contrast the density of fibromata, consisting wholly of the latter.

The enormous force, moreover, which a growing mass of cells, however fragile and pulpy, exerts under other conditions than that of cancer, is evidenced by the heavy flagstone, which we often see pushed up by fungi underneath. A large cask has been found elevated to contact with the roof of the cellar by similar minute organisms developed in the wine which has escaped from a casual leak.

When the meshes of the mammary connective-tissue stroma are distended by small collections of new cells, considerable tension upon the resisting fibrous framework of the organ necessarily ensues. Hence the skin-covering becomes puckered, wrinkled, and often manifestly drawn in towards a carcinomatous growth. If the colony of cancer-cells be situated among the lactiferous ducts in relation to the fibrous nipple, that structure becomes retracted. Though usually associated with (scirrhus) carcinoma, the nipple may also similarly disappear from view owing to a small abscess among the ducts, or even to chronic inflammatory changes short of suppuration. The skin-dimpling of subcutaneous lipomata is of like mechanical production.

When the cells of carcinoma are placed in another tissue-environment, as for instance in a lymph-gland, little or no wrinkling or contraction ordinarily ensues; and the further development of the new colony is often characterised by an entirely opposite condition. Hence the physical appearances associated with scirrhus cancer must be referred to the anatomical structure of the mamma.

A similar contraction of surrounding parts is seen in other chronic forms of the cancer-process. The malignant affections of the intestinal canal, most commonly cylindromata, are often found embedded in a tangled mass of various viscera, many considerably displaced by secondary adhesions from their proper situation; as the result of long-continued inflammatory irritation.

The characteristic alveolar structure of carcinoma, most marked in that of the mamma, is dependent upon cell-collections developed within the natural meshes of the skeleton connective-tissue framework, which are eventually distended far beyond their normal dimensions. In this organ, there is little, if any, new fibrous tissue laid down in average cases; in those exceptionally chronic the inflammatory hyperæmia always attendant upon cancer, involves a certain amount of fibrous tissue hypertrophy. The atrophic breast-cancers of twenty or thirty years' standing contain an inordinate amount of fibrous tissue relatively to cell-elements, and were thus once described as "fibrous cancer."

V. *Pain.*

The remarkable absence of uneasy sensations in the early stage of some prevalent malignant lesions singularly contrasts with the intense suffering which marks their later period of growth. Not seldom, also, the most repulsive-looking masses cause little or no suffering, while a deposit, insignificant in appearance and in size, may involve acute agony. As pain is a wholly subjective symptom, its etiology can only be discussed approximatively. Between the sensations of one individual and those of another there can be no scientific standard of comparison.

The pain attendant upon cancer is referable to the irritation of sensory nerves in four modes :

- (a) Tension of fasciæ, or other fibrous investment.
- (b) Direct pressure.
- (c) Necro-biotic changes.
- (d) Mechanical irritation by exposure to agencies without.

The symptom may further be resolved into two elements or varieties of uneasy sensation :

- (a) A sensation in the part, described as "gnawing" or "aching"; in an ulcerated cancer, as "burning." It is continuous, or sometimes remittent; varies in degree from a merely unpleasant consciousness of something wrong, to very severe suffering.
- (b) Intermittent darts of acute pain, obviously referable to the nerves, and described as "neuralgic."

Various troubles may also be produced mechanically by the tumour, apart from its development as cancer. Such are the bearing down caused by rectal "fungous" growths; the frequent and difficult micturition associated with polypoid growths of the bladder; the cough and spasmodic dyspnoea of laryngeal disease.

The most significant and constant of the above elements is *tension*—the tension which a steadily progressive cancer-parenchyma produces in those existing structures which environ it. A cancer-growth which involves rapid cell-proliferation under a rigid envelope is productive of intense pain, until that envelope becomes ruptured. The melanotic sarcomata of the uveal tract rapidly produce tension of the sclerotic; in these, acute pain is a very early symptom, materially lessened when the advancing cell-growth has freely eroded that structure.

Conversely, masses of cancer sprouting from a mucous surface, with no superincumbent fascia, grow to a large size, with total absence of malaise, except what may be due to their bulk and situation. Such are lympho-carcinomata of the tonsil, true cauliflower excrescence of the uterine cervix, some polypoid growths of the rectum, &c.

In carcinomata of the female breast, conspicuous differences in the sensations experienced are referable to variations of the tenacity of the fibrous tissues, both of different individuals, and also at the several periods of life. Scirrhus carcinoma, developed in the shrivelled, fibrous breast of an elderly woman, is always very painful from the first. A similar growth in the well-developed organ of a female in the prime of life, may be long singularly painless. The acute encephaloid carcinomata are growths of acinar epithelioid cells, which have proliferated

exuberantly in a vascular mamma, with no hindrance from superincumbent fibrous tissues. In the patients thus afflicted, that structure is found to be lax, succulent, easily torn. These "soft cancers" commonly increase to huge dimensions, with little or no suffering.

The first of the two sensations above described is referable to tension. It is more or less continuous, and markedly different in character from the second. The "neuralgic darts of lancinating pain," specially characteristic of scirrhus carcinoma, are due to direct pressure upon sensory nerves, by the acini, ducts, and lymph-spaces of the part distended by new cancer-parenchyma. They are intermittent, the periods of return varying from weeks to minutes. When large nerve-trunks are subjected to pressure, excruciating agony is the result. The most painful of all malignant lesions (as measured by the doses in which morphia is needed to procure relief), are epitheliomatous infiltrations of the root of the tongue and hinder regions of the mouth, where the sensory nerves are specially numerous.

Exuberant malignant growths upon a free surface, and those which infiltrate without resistance the surrounding parts, seldom cause appreciable pain prior to the stage of ulceration.

Degenerative changes in malignant parenchyma involve the sensations of throbbing pain, and heat ordinarily associated with inflammation. When ulceration has taken place, chronic excavated and infiltrating sores produce "burning" pain; acute exuberant fungous excrescences may be almost painless. It would seem that tension is here again the chief cause; but the tension due to individual cell-collections, each in the pouch of a fibrous stroma, rather than that exerted by the gross mass. The hard margin of cancerous ulcers is referable to cell-growth filling up the lymph-spaces, together with attendant hyperæmia. Local hæmorrhage temporarily alleviates, by lowering tension.

An infiltrating sore gives rise to both forms of pain—continuous, and neuralgic or intermittent. The part is now exposed to the decomposing influence of the air, as well as to mechanical irritation by the clothing, particles of wool, hair, dust, &c.

The sense of general weariness, aching in the limbs, and extreme exhaustion, resulting from marrow-infection, are alluded to at p. 68.

VI. *Degeneration.*

The degenerative changes which all cancerous parenchyma undergoes—disease-processes engrafted upon a disease—in the majority of cases materially enhance the sufferings, and shorten the life of the individual. On the other hand, in a small minority, they are attended by beneficial results to the organism. The myxomatous degeneration of sarcoma-tissue, and the allied colloid modification of carcinoma, are examples of this rather conservative effect, retarding the “progressive tendency to death.”

Rapid cell-growth, in the development of cancer, is necessarily correlated with speedy cell-death. The most acute forms are those which most conspicuously display degeneration-phenomena, usually on a macroscopic scale. In the more chronic, however, a process of decay is seen to commence simultaneously with the proliferative; and even in the most recent tumours, relatively large collections of dead or dying cells are invariably found, on microscopic investigation, amid those newer cell-elements which are still actively multiplying. The latter are always situated at the *periphery* of each acinus, in the alveolar forms of cancer; are thus in contact with the normal tissue on which they are seen to prey. The former, and older, with that amorphous *débris*, which is the result of their disintegration, invariably occupy the *central* regions of the acinus, being completely environed by the others.

When microscopic sections are examined, the vital and the dead-cell elements contrast in their susceptibility to the ordinary staining agents of protoplasm. The vital activity of each individual cell may be roughly measured by the facility with which it is dyed by logwood, as also by the vividity of the coloration seen in its multiple nuclei; in other words, by the presence or absence of *chromatin* in the nuclear reticulum. But degeneration, even on a very minute scale, is apparent to the unaided senses, on the cut-surface of almost any malignant tumour. Those minute masses of cell-*débris*,

which as opaque spots dot the surface of every scirrhous carcinoma of the mamma, and which can be easily squeezed out as caseous pellets, consist, not as was formerly taught, of ducts filled with the altered secretions of the gland, but of the central core of dead cells which occupies the middle of each acinus.

In the healthy organism, the effete products are readily carried off from each part or organ *per* the lymph-current to the proximal lymph-glands, there undergoing a process of digestion which ends in the return of a purified residuum to the circulating current. In the more parenchymatous forms of cancer, as carcinoma and epithelioma, the provision thus made for sanitary drainage proves inadequate to cope with the abnormally active cell-proliferation. A large quantity of the effete material fails to be drained off from the disease-area by the lymphatic vessels and remains *in situ*, contributing by its bulk, pressure-effects, and obstruction of lymph-channels and blood-vessels, to the subsequent death of the part concerned.

In the later stages of any malignant new-growth, the tissue affected is commonly seen to decay upon a gross scale. Large portions may slough away *en masse*, the main cause being the blockage of afferent blood-vessels by growing cancer-parenchyma, the food-supplies being thus cut off. Apart from this thrombic obstruction, the larger each cell-collection becomes, the further are the older cells occupying its core removed from their two sources of nutrition, the healthy tissues of the part, and the blood.

Added to the necessary result of these inherent sources of decay are the effects of *secondary inflammation*. "Liquefactive degeneration," or the "softening of a cancer," denotes the net product of these forces combined. At one, or more commonly at several spots in such a tumour, we find regions, formerly hard, becoming soft, boggy, often attended by a state of fluctuation. Here eventually, what is to all intents and purposes an abscess, forms, points, and ruptures with the discharge of abundant cell-débris, mingled with extravasated blood, serum, and scanty pus. We have what may be considered normal processes of decay in the new cells, mingled with

the sequelæ of inflammation—serous effusion, the death of an army of leucocytes.

Degenerative changes, whether as “liquefactive degeneration” or as sphacelus, commonly result in the removal of considerable portions of cancerous tissue. Not seldom, partial cicatrisation follows. But the cell-decay is never carried far enough to procure complete destruction of the disease-area; and the destruction of protecting integument, &c., is apt to promote more rapid proliferation of the residual cells.

Those cells, whether epithelial or of the connective-tissue series, whose normal function it is to secrete pigment, give rise to acute forms of cancer (melanotic), in which the new cells resemble their progenitors in the possession of this attribute. There is no reason, however, to regard the tendency of the malignant protoplasm to undergo conversion into pigment, as influencing the proliferation of the individual cells or the clinical career of the disease.

Cancer contrasts with tubercle in that large masses of parenchyma which have undergone caseous degeneration are common in the latter, are exceptional in the former. Such caseous decay on a minute scale is, however, an ordinary feature of malignant growths; the caseous pellets of scirrhus carcinoma in the breast being an example. When softening has taken place, the evidences of fatty or caseous degeneration are partially masked by the products of inflammation.

Calcareous degeneration—i.e., a concretion of lime salts amid cancer parenchyma—is a very rare phenomenon in malignant tumours. When present, it is usually found in growths from bone or periosteum. It often appears to be a feeble attempt at true ossification. (See Osteoid Sarcoma.)

Many carcinomata or other cancers arising from epithelium or epithelioid cells (particularly the cylindromata of the rectum) show large portions which have undergone a *mucoid* change, their tissue having been evidently saturated by fluid exudation, which has largely obliterated their microscopic characters. Occasionally the secondary changes may be referred to serous œdema, the result partly of hyperæmia, partly of pressure upon the vessels and venous stasis; but often they appear to be the result of degenerative changes in the protoplasm of the

cells themselves. Colloid cancer is most probably a rare variety of this mucoid degeneration, by no means confined to connective-tissue neoplasms. The familiar *globes epidermiques* of epithelioma are instances of the same phenomenon on a microscopic scale in a tumour derived from pavement-epithelial cells.

CYSTS, often present as secondary formations in certain varieties of cancer, own several modes of origin. They may result, though rarely, from obstructed ducts or lymph-channels, which subsequently undergo dilatation, the retained fluid becoming considerably modified in composition. Some cysts in carcinoma of the breast are evidently dilated lactiferous ducts; common as *antecedents* of the malignant tumour, less often resulting secondarily from the mechanical obstruction which the new cell-growth involves.

Much more frequently, mammary cysts in cancer result from dilated acini, the proliferating cells of which have undergone a mucoid degeneration, and have become converted into fluid. The quasi-malignant new-growths termed "cystic fibroma," "adeno fibroma," are studded with numerous cysts, large or small, owning this method of production (p. 214).

In a few cases of other species of cancer, cysts result from the rupture of blood-vessels into cavities, with subsequent alteration in the blood-clot. Sarcomata in bone are often largely composed of cysts, whose cells contain numerous vessels, bleeding profusely on incision, and significantly termed "blood-cysts." Some chronic forms of tumour in the lymph-glands, both malignant and benign, are found associated with cysts filled with serum and degenerating blood-clot.

All cysts in the aged are prone to develop the malignant process *secondarily*; these may long precede the cancerous symptoms. Those which follow a cancer-growth, and are consequent thereon, when abundant, have been referred to as "cystic degeneration" of cancer; but the term is hardly appropriate.

The *ulcers* which follow the removal of integumental structures from cancer-parenchyma, by combined necro-biotic and inflammatory processes, present a general uniformity in

physical characters throughout the various species. They are of two types.

- (a) The *cavernous* or *excavating ulcer*, characterised by a hard, livid margin, an excavated base, absence of prominence, slowly progressive erosion of the deeper tissues. This is the *chronic* form of the ulceration-process.
- (b) The *fungous* or *exuberant ulcer*, attended by a prominent vascular mass of malignant granulations, a livid margin with relatively slight induration, rapid increase in the bulk of the protuberance, which often eventually sloughs away, leaving an excavation of the former type behind. It is the *acute* phase of cell-growth in connection with an ulcer. The epithelial "papillomata" of mucous membranes, and "intra-cystic vegetations" in cysts of various organs, are analogous.

Some cancer-species more affect an ulcer of the former type, some, one of the latter; but there is no fixed line of demarcation. At one period a single malignant ulcer may develop the acute fungous excrescence; at another it may burrow deeply beneath the surface; and, of a single sore, different regions sometimes present the two modes of growth. The scooped-out ulcer of average *epithelioma* on a mucous membrane is well known; such lesions on tongue or lips comparatively seldom fungate, but may do so. At the uterine cervix some of the prominent tumours met with are of epithelial origin; they eventually give place to an excavation by sphacelus. *Rectal cylindromata* more often excavate than the reverse, but are sometimes met with as polypoid masses. The ulcers of mammary carcinoma offer remarkable contrasts in appearance, from a shallow fissure or excoriation to a huge tumour; and one portion may be excavated, while another throws out a luxuriant protuberance. The slowly progressive *rodent ulcer* is always hollowed out and eroded in appearance; the rapidly growing *lympho-carcinoma* generally throws out a vascular excrescence, with little or no surrounding induration. The ulcers of *sarcoma* markedly vary in individual instances.

All malignant ulcers present a family likeness, and it is not possible to credit any with an unvaried mode of growth, or with outward and visible characters, which are always uniform.

VII. *The Formation of Globes Epidermiques.*

Epithelial cancer (Epithelioma) presents certain remarkable agglomerations of malignant cells, which were designated by Lebert "*globes epidermiques*," and which are also known as "birds' nests," and as "laminated capsules" (Paget). They are not entirely pathognomonic of malignancy, being present in corns, and common in all accumulations of epidermis. But in a well-marked form they are almost invariably associated with the cancer-process, and their presence in any quantity in a microscopic section goes far to stamp the new-growth as ranking in that division. In different specimens, and in neoplasms from different parts of the body, they vary considerably in size. The most typical I have encountered in point of size, as well as in relative abundance, occurred in an epithelial growth on the vulva, the malignant infiltration here consisting of little else.

As with other degenerative changes, the formation of *globes epidermiques* commences in the *midst* of cancerous epithelium, rarely or never at the periphery. In a section stained by logwood the cells at one or at several spots in a collection of cancerous parenchyma show a dull cloudy appearance, contrasting with the bright blue of the surrounding mass. This constitutes the first stage.*

In the second stage, we find at the centre of the cloudy area a roundish space, which, in a logwood-stained section, appears of a dusky hue. The outline is hazy and ill-defined; no capsule can be discerned. Often one or two very dark or highly refracting vesicles occur, studding the dark region.

In the third stage we arrive at the typical *globe epidermique*. The peripheral cells have become flattened and elongated by the pressure of fluid in the centre, so as to appear fibrous; the different layers form a concentric imbricated capsule. This

* Whatever the stain employed, the *globes* appear of duller hue than the rest of the parenchyma; the fact being indicative of degeneration.

laminated or imbricated condition is best seen when the section is oblique. The nuclei have also become elongated so as to resemble the spindle- or staff-shaped nuclei of white fibrous tissue. In the centre of the new perfect *globe* is a cavity, filled with mucoid fluid; it is often divided into two or more compartments. Often one or more vesicles, similar to those previously described, but larger, are found. The dusky colour of the whole is much more pronounced.

Around the imbricated capsule is commonly a fringe of cloudy-looking malignant epithelium. This is by degrees converted into the imbricated scales, being flattened between the active cells proliferating externally, and the increasing fluid effusion within. Many of the nuclei are seen to be undergoing vacuolation, being gradually supplanted by the mucoid fluid.

In some specimens large compound globes are formed, apparently by the coalescence of the preceding. Plate I. shows two of these taken from an epithelial growth at the margin of the anus; with the precedent stages.

The outer layers of flattened cells constitute a fibrous-looking capsule. Within are smaller cystic-looking bodies resembling the solitary *globe*, but much less typical in appearance. Between and around these is a stroma of well-defined meshes, showing here and there small vesicles of fluid, and presenting a close resemblance to the skeleton basis of a myxoma. Indeed, the *globes epidermiques* may be compared to myxomata on a small scale.

Elaidin has been detected by analysis in the mucoid fluid.

The origin of these peculiar bodies has been ascribed to a process of endogenous cell-formation, to the development of a brood of secondary cells within a single large parent. That view is incompatible with the light in which malignant cells appear under the microscope—soft jelly-like masses of protoplasm with no definite wall; and is not compatible with the appearances above depicted. A small area of cells always appears as the starting-point of the *globe*, never a single cell. The multiple nuclei commonly present in individual members of any epitheliomatous parenchyma are natural concomitants of the active proliferation-process which is going on. That feature is common to all varieties of cancer, whereas “cell-

nests" occur only in the former. The most typical and abundant *globes epidermiques* are found in epithelioma arising on or implicating a mucous membrane; if the skin alone is the seat, these structures are comparatively small and ill-defined.

The physiological law upon which the process in question appears to depend appears to be the original tendency of the cells to secrete a mucoid fluid. When these become epidermis, the function remains in abeyance throughout life; when they line a mucous tract, a continuous process of growth and disintegration takes place, whereof mucus is the result. When they pass from their normal sphere and infiltrate the deeper tissues, they still carry with them their disposition to secrete mucus. This finding no outlet, the *globe epidermique* is the subsequent product of degeneration combined with pressure-effects—fluid within—an actively growing mass of malignant epithelium without.

VIII. *Infection of the Bone-marrow.—Regurgitant Lymph-currents.* (PLATE V. AND VA.)

The marrow of bones belongs to the class of "lymphoid" or "adenoid" tissues. Roughly speaking, it may be described as consisting of a very delicate connective-tissue stroma or reticulum laden with abundant cells of the "lymphoid" type; copiously supplied with blood-vessels and lymphatics, and hence having intimate relations with both blood- and lymph-currents. It is characterised by high functional activity, most conspicuous before adult age, but persisting until the close of life. In its most active stage, it is known as "red" marrow; subsequently to adolescence and to the cessation of bone-growth, portions undergo fatty degeneration and constitute "yellow" marrow. The most important function of the marrow is the manufacture of red corpuscles. In this respect it is believed to differ from the other "lymphoid" tissues or organs; while these give birth only to leucocytes, the marrow generates both leucocytes and erythrocytes (Gulland). The activity of the functional processes carried on in the marrow strikingly contrasts with the seeming passivity and permanence of its bony case.

When malignant cell-particles have gained access to the

marrow; the vascularity and cellular structure of the latter render it a favourable soil for their luxuriant growth. Further, its close relations with the blood-current render it a vehicle for wide dissemination. And the interference with its blood-forming functions which abundant cell-proliferation in the marrow of various bones involves, causes marked deterioration in the quality of the circulating-fluid. Yet the course of these important changes is largely masked by their environment, which contributes to render their physical indications peculiarly latent and "insidious."

The phenomena of marrow-infection are best studied in connection with that local variety which most constantly gives rise to them—viz., chronic carcinoma (scirrhous) of the female mamma.

The adjoining *humerus* is ordinarily first to become implicated. At a period subsequently to enlargement of the axillary lymph-glands, the upper epiphysis becomes tender to the touch, and seems, on careful comparison with the corresponding bone on the opposite side, to be somewhat enlarged. Concurrently, the patient complains of aching pain down the back of the arm. There is no real thickening of the bone, the apparent enlargement being due to an irritative hyperæmia of the periosteum, which may eventually disappear. Later on, the *sternum* at the junction of the upper with the middle portion begins to show undue prominence, and very gradually bulges. This "sternal symptom" is hardly ever noticed by the patient; it causes no pain or inconvenience, rarely even tenderness; is only noticeable when the person is erect; disappears, or nearly so, when she is lying down. It may be simulated by natural conformation of the part; it occasionally, but not often, ultimately proceeds to a distinct tumour-formation; is explicable on the ground of a gradual infiltration and decalcification of the bone by malignant cells, whence a ready yielding to pressure when the thorax is held erect.

Pains of an aching character, worse at night, are complained of in various bones. They resemble rheumatism in being relieved by the internal administration of salicylates, and in the nocturnal exacerbations; they differ in being referred to the

bones, and in being not as a rule confined to the neighbourhood of the articulations. They may be felt in any part near bone, but the three seats of election are :

- (a) The posterior and outer part of the upper arm on the same side as the disease, shooting down from the shoulder.
- (b) The corresponding scapula.
- (c) The loins.

Strange to say, the sternum, as before stated, does not usually give rise to any complaint. Concurrently with the "rheumatic" pains, the individual describes and exhibits an ever-increasing physical weakness.

The three cardinal symptoms of marrow-infection are :

- (a) The "humerus symptom."
- (b) The "sternal symptom."
- (c) The "rheumatic" pains.

The first is not reliable ; the apparent enlargement being but a slight fulness, and not permanent. The second is characteristic, and error can only arise when the woman exhibits a natural prominence at this spot. In that event, however, she is conscious of having always been unduly prominent there ; on the other hand, the woman with a cancerous sternum is rarely or never conscious of the bulging, however patent to the onlooker this may be. And the presence of the gnawing, deep-seated, aching pains in one or more of the localities above referred to, "clinches" the diagnosis of marrow-infection by the cancer-cells.

Deposit in the marrow is entirely independent of any infiltration by contiguity, as when a cancerous breast becomes adherent to the ribs. It begins when the part is freely movable, but after the axillary lymph-glands have increased in bulk. After death, typical scirrhus acini will be found, if carefully sought for, in various bones wide apart—*e.g.*, both humeri, lumbar vertebræ, sternum, &c.; sometimes associated with tumour or fracture, much more frequently without. (For further details, see original papers in *Lancet*, March 7 and 14, 1891 ; *Brit. Med. Journal*, March 12, 1892.)

"Atrophic" cases of breast scirrhus are not known to produce marrow-infection; they are not, as a rule, accompanied by rheumatic pains, or the other symptoms above described. They occur in women with ill-developed mammae of the male type; therefore not possessing that intimate association with the blood-vascular and lymphatic systems characteristic of the average organ, and best described in Sir Astley Cooper's monograph.* So also carcinoma of the male breast is not known to cause marrow-infection.

The path whereby infective particles pass from a carcinomatous mamma to the marrow of the humerus on the same side is furnished by the lymphatic vessels. Normally, the lymph-current from both marrow and breast flows towards the corresponding subclavian vein, *per* the axillary, subclavian, and supra-clavicular lymph-glands. When these become blocked by growing cancer-parenchyma, the flow takes place in various abnormal directions, and its course may be entirely reversed. In this way cell-particles, which should pass to the lymph-glands, are carried to the part in question, and there deposited. The physical signs of this occurrence are always consecutive to enlargement of the axillary glands.

The sternum is also infected by way of the lymphatics, but indirectly. In contact with the portion of this bone, the progressive prominence of which occasions the "sternal symptom," are the remains of the thymus, a "lymphoid" organ, traversed by large lymphatic vessels. It is never entirely obliterated, but probably retains until the end of life its close connection with the lymphatic system. The cell-particles from the diseased breast are brought to the remaining thymus-tissue by the lymph. Being there arrested, they grow, and eventually infiltrate the bone by direct contiguity, thus causing the prominence above described,†

Deposits of breast-carcinoma in such distant structures as the lumbar vertebrae, femora, cranial bones, can only be

* *Anatomy of the Breast*, 1840.

† The thymus attains its full size at the age of two years; then dwindling until at puberty the greater part has disappeared. A mass of fat persists, in which remains of the characteristic structure can be discerned by the microscope until an advanced age. The period of involution has wide limits of variation in different individuals.

referred to general blood-infection, consequent mainly on that of the marrow.

The occasional occurrence of spontaneous fracture of the long bones associated with breast-scirrhous, is due to actual deposit of cancer cells in the marrow, then specially abundant and widely disseminated. The event is indicative of more extensive infection than in the "insidious" form. The dried specimens of "fragilitas ossium," taken from patients afflicted by the same disease, and not uncommon in museums, are also examples of this marrow-infection in an extreme degree; all the cancer-parenchyma having been carefully removed in the process of preparation.*

In carcinomatous disease of other organs than the female

* The remarkable "insidiousness," and utter absence of conspicuous symptoms which may be associated with very extensive malignant disease of the osseous system, is strikingly exemplified by a case of "Osteo-colloid Cancer of the Skeleton," reported by Dr. Moxon in vol. xxii. of the *Path. Trans.* A man, aged twenty-three, died apparently from hæmorrhage caused by the removal of some warts from the prepuce. At the autopsy, very numerous tumours bearing out the title, were found in the *calvaria*, all down the *spinal column* as far as the sacrum, on seven of the *right ribs*, and four of the *left*. Yet the existence of any malignant disease or tumour whatever had been entirely unsuspected, during life!

The length of time during which also secondary marrow-deposit may persist without symptoms, is indicated by case at p. 131.

Regurgitant Lymph-currents.—In vol. iii. of the *St. Bartholomew's Hospital Reports*, is an interesting case (Art. V.) reported by Mr. C. H. Moore; in which, if the author's explanation be in all points accepted, the above phenomenon was very clearly exemplified. A woman was operated upon for what seems to have been encephaloid carcinoma of the left breast, in an advanced stage. There was subsequent "recurrence" below the scar; next followed deposit in the lymph-glands of the *right* and *left* groin axilla; and *after* this, implication of the right breast. The woman speedily died with very extensive visceral and superficial disease; whose course Mr. Moore describes as follows. In this case "the morbid elements happened to be suspended in a white creamy liquid"; so that diffusion by lymph-currents was manifestly favoured, and "the continuity of the stream everywhere traceable." On the left pleuro-cardial septum in particular a network of lymphatics, charged with this creamy fluid, was seen passing from nodule to nodule.

"The scar following excision of the left breast intercepted the upward superficial lymph-current to the neck." The disease then reappearing below this, "flooded the lower half of the chest on the left side, and passed by anastomosing lymph-tubes to various glands"; thus infecting the lymph-glands of the *right axilla* and *left groin*. The liquid then flowed through the chest-wall into the lymphatics of the *left costal pleura*, and so to the *upper glands* of the *anterior* and *posterior mediastina*. It next infected the *right breast*,

mamma, and in other species of malignant tumour, infection of the bone-marrow is found occasionally to occur. As that structure has only been microscopically examined when a tumour or fracture has called attention thereto, it is possible that deposit may here also take place insidiously from time to time. There is at present no evidence, however, of such an event, and patients with other forms of cancer do not exhibit the definite train of symptoms above described in association with breast-carcinoma.*

In other species of malignant growth than carcinoma, and in cancerous disease of other organs than the female mamma, deposit of cells in the bone-marrow is by no means unknown; but, so far as is at present ascertainable, always gives rise to tumour or to fracture. The cases which offer the best marked illustration of dissemination are those of periosteal sarcoma in long bones, which have gained access to the central canal. Amputation of the affected limb is commonly followed by a brief period of seeming health, followed by relapse and speedy death. At the autopsy, numerous tumours are found growing from different and distant bones; they are identical in structure with the one previously removed. Some instances in which the metastases appeared with great rapidity, and the primary development was not in the extremities, have been recorded by foreign authors as cases of "multiple primary sarcomatosis." The phenomenon is common in association with cancers primarily situated on bone. The number, distance from each other, and luxuriance of the secondary masses demon-

the lower anterior and posterior mediastinal glands, with the left pleuro-cardial lymphatics. Presently the *bronchial*, and also the *lumbar*, lymph-glands enlarged. As lastly the diaphragm became covered with it, the white matter passed into the suspensory ligament of the liver, and into the liver itself near that ligament; here two small nodules were found at the autopsy. Then upon the destruction of the cicatrix by ulceration, the infectious liquid "rapidly passed in normal current to the upper flap, and filled the glands at the left side of the neck."

The *left lung* was thus covered by nodules directly derived from the diseased area; but none existed in its *interior*, in the *pericardium*, *right pleura*, or *right lung*, "which were reached by the blood, but were beyond the limits of dissemination from the left breast."

* I have never known a patient suffering from any cancer but that of the female breast, complain of the aching pains in back and limbs, and overwhelming lassitude, symptomatic of deposit in the marrow; which are so often described by women with the latter.

strates the qualities of the marrow as a specially favourable *nidus* for cancer cell-growth, as well as the diffusion consequent on deposit therein.

Cases of marrow-infection by Melanotic cancer are referred to at p. 180; by Cylindroma Recti, at p. 158; by Osteoid Sarcoma, at p. 131.

In the *Path. Trans.* (xl. 187), Mr. J. Hutchinson narrates the following case:

A medical man, aged sixty-eight, found his testicle enlarge. This was excised; *the microscope revealed nothing beyond simple hypertrophy*. Eighteen months afterwards, the remaining organ also began to increase in bulk, and being removed, a round-celled parenchyma was found. Two years later the patient fell, hurting his leg. A similar tumour then grew from the tibia, at the spot injured, and the bone eventually underwent spontaneous fracture. Death took place six years after the first operation.

The above case illustrates a phenomenon noticeable in the case of osteoid sarcoma, related at p. 131. The marrow-deposit gave rise to no symptoms until some bone received a blow, when a tumour forthwith appeared at the locality injured. It appears, moreover, to have been an instance of distal infection by the blood-current. In some of the others, notably in cancer of the rectum, which, when high up, adheres to and may directly erode the sacrum;* there was obviously *direct* infiltration.

* The insidious character of the ordinary marrow-infection which takes place in carcinoma of the mammae, suggests that obscure instances of bone-disease may be accounted for by more detailed examination of the marrow than usually takes place. Thus many cases of "mollities ossium" have been found associated with a malignant tumour-formation in some particular bone. (See p. 303.) It is highly probable that others are really due to a localised or diffuse cancer-growth.

The obverse condition to "mollities," is that hypertrophic growth, known as "osteitis deformans"; in which again, an actual cancerous neoplasm has been discovered with very considerable frequency. Such may have existed, though not found, in the remainder.

The hypertrophy of "osteitis deformans" seems analogous to the redundant fibrous tissue in scirrhus of the breast; and the absorption of lime-salts in mollities, to the decalcification of bone by *any* deposit of cancer in the marrow. Rather curiously, the same decalcification is sometimes exhibited by osteoid sarcoma, a tumour characterised by the abundant growth of new bone in abnormal sites.

Possibly some other obscure diseases, in which the blood becomes conspicuously deteriorated without obvious cause, may eventually be referred to changes in the marrow.

PART II.

THE VARIOUS SPECIES OF CANCER.—THEIR CLINICAL PECULIARITIES AND MORBID ANATOMY.



CHAPTER I.

EPITHELIOMA—*Syn.*: EPITHELIAL CANCER.

Definition. — Cancer originating in surface epithelium or epidermis.* (Plate II.)

Site.—From the definition it follows that the disease *can* primarily occur only in skin or mucous membrane. Epithelioma has previously been referred to as the most useful type of cancer in general. From first to last its phenomena, in the majority of instances, lie open to clinical observation, and an attentive survey of these enables us better to comprehend what takes place when the malignant process attacks other tissues in more obscure regions of the body. Thus the whole of its career serves to emphasise the essentially local nature of malignant disease. Some insignificant breach of surface occurs from any casual cause; the epithelial or epidermic cells bordering on this are repeatedly rubbed or otherwise irritated. They gain access to the subcutaneous or submucous connective-tissue, and proliferate luxuriantly. The new cells erode the healthy tissues around, preying upon them as autositcs; nuclear particles are carried by the lymph-current to the proximal lymph-glands, where they also grow metastatically; the usual degenerative changes follow. In short, we find in epithelioma an epitome of all the phenomena exhibited, whether in lower

* The morphological variations found in epithelial cells seem to be mainly a matter of environment. All shapes give birth to a malignant growth with identical cell-forms and clinical course. (See note on *Cylindroma*, at p. 157.)

or in higher degree, by cancer of all kinds, save only that the presence of cell-particles in the blood is less obvious, and that its corollary of metastases in distant portions of the body is less often met with than in the more virulent carcinomata and sarcomata.

Again, when we consider its antecedents and mode of causation, epithelial cancer forms a convenient standard of comparison and of analogical inference. The disease is rare until time has manifestly set its degenerative impress on the individual, and also unless the cells of the part attacked have long been in an unhealthy state of lowered vitality. It never appears without a manifest excitant, here always mechanical. The infection-path along the proximal chain of lymph glands is always precise, and capable of being accurately predicted. There is rarely the least suspicion of heredity. A definite history is much more easily obtained than is the case with the more concealed cancerous developments in female organs. Further, the absence of cell-particles circulating in the blood-current, and capable of active life as embolic offshoots lodged in distant regions of the body, precludes the obscurity and the complication of symptoms attendant upon advanced stages of these latter maladies.

So far as we can at present discern, all are equally liable to suffer from epithelioma, the conditions being equal. Given an equivalent exciting cause and a similar morbid state of the cells in the part, the effect will be alike in every instance. The disparities of sex, of relative liability shown by different parts, of particular occupations, &c. &c., do not appear to hinge upon differences of structure, upon functional or sexual peculiarities, but wholly and solely upon questions of direct causation.

We do not often find an epithelial cancer upon an exposed surface before ulceration has taken place, the reason being that a fissure or excoriation is so commonly the starting-point. Occasionally, however, there is an attempt at tumour-formation, the first stage showing a tubercle of no large dimensions, with the surface still intact. A microscopic examination will display relative increase in thickness of the inter-papillary process, with commencing deposit in the corium or mucosa, and superabundant leucocytes in the tissues around. Upon protected

mucous membranes, a first stage of prominent tumour-growth is more common—*e.g.*, cauliflower excrescence of the uterine cervix, vesical papillomata. The cutaneous wart which engenders epithelioma after a long course of years, is the most familiar example of the cancer-process grafted upon a benign neoplasm, a hypertrophic growth of normal tissue. In such cases the presence of abnormal hyperæmia, when the parts around are incised, is a surer evidence of malignancy than is the actual distribution of the epithelial cells, seen under the microscope.

Epithelial cancer is *ab initio* most commonly met with as an excavated and depressed ulcer, with hard edges. This hardness is almost, but not quite, invariable; it may be wanting at a very early period of the malignant lesion, but always supervenes very quickly. It is the result of infiltration of the healthy tissue immediately around the actual disease-area, by the proliferating epithelium, combined with that hyperæmia with the necessary concomitant of cancer in every shape. The new cell-growth acts practically as a foreign body, sets up irritation; hence serous exudation, and immense numbers of leucocytes, solitary or in large masses, in the immediate vicinity of the new growth; the tissues thus affected feeling tense and indurated to the touch. Occasionally, on the integument, the disease is found as a tumour of peculiar shape, pedunculated, with constricted stalk and broad flattened ulcerated summit, bearing considerable resemblance to some species of fungus. At other times it constitutes a prominent warty protuberance.

Ordinarily, the surface covering of an epitheliomatous infiltration has been removed by ulceration before a microscopic examination takes place; only in exceptional incipient cases is it found intact. A thin section then shows great thickening of the epithelial or epidermic layer, with prolongation of the inter-papillary processes. The underlying connective tissues is markedly hyperæmic.

The base of an epithelial ulcer consists of the healthy tissues riddled in all directions by malignant epithelium, grouped for the most part in irregular columns. The intervening partitions of the uneroded normal structures are crowded with leucocytes, and betray all the indications of vascular engorgement. Minute thrombotic clots fill the numerous sections of dilated blood-

vessels. Many of these contain malignant cells and nuclei, in addition to the leucocytes, which form their main bulk. Not seldom they are seen invested by a fringe of new epithelium, diffusing itself along the peri-vascular lymphatics. Around the margin of the ulcer we see great thickening of the epithelium or epidermis, together with that overgrowth and projection downwards of the inter-papillary processes above described.*

Each cell-mass of any size is seen to contain one or more degeneration-areas, where the nuclei resist coloration by the ordinary stains. These areas occupy the central portions; the periphery of the column invariably consists of the more recently developed cells, brightly stained, and actively proliferating. The characteristic *globes epidermiques*, whose mode of formation has previously been described, abound generally at the core of the faintly coloured regions. They are variable in number and size, are most plentiful and conspicuous when a mucous membrane is the seat of disease. In less prominent degree they occur, however, in almost any mass of partially degenerate epithelium; in corns, callosities, the edges of Rodent Ulcers, within Sebaceous Cysts, and Blastomata.

Together with changes in the position of the epithelial cells relatively to the normal tissues, are now found grave modifications in their structure. In place of the large cell-body, with clearly defined outline, somewhat angular appearance, a small round or oval dot as nucleus, and a still smaller speck for nucleolus; the cancerous cells lose more or less their definite boundary and somewhat crumpled look. While presenting an infinite diversity of shape, they become fuller and more rounded, with edges readily frayed, conveying the impression of

* It may be pointed out that many text-book delineations of epithelioma err in representing this marginal condition, with the surface-epithelium intact. Over the main disease-area, such a state of things is found only in a few rare and incipient cases. The characteristic feature of epithelial cancer is infiltration of the sub-mucous or sub-cutaneous tissues by new epithelium in columnar masses; the surface-covering having been wholly removed by ulceration.

Again, the individual cells are often represented as exactly identical in appearance with normal epithelium; from which they profoundly differ in almost every particular.

an amorphous mass of jelly, without investing wall or membrane. The nucleus is huge, and has ceased to occupy the centre of the structure. Only exceptionally is it solitary; generally there are several, the number increasing with the employment of higher microscopical powers. These multiple nuclei are in various stages of development. Commonly with two or three large, well-defined, and readily stained by logwood, are found from five to twenty others of different sizes, and of varying susceptibility to the action of protoplasm dyes. There is a corresponding increase in the number of nucleoli. The older cells are seen to be undergoing a process of *vacuolation*; one or more vesicles containing fluid appearing within the nuclei, and gradually increasing at the expense of the protoplasm, until the whole is converted into a minute cyst-like body.

From the inception of the disease, the part attacked and the regions immediately bordering thereon, display, more or less, marked *hyperæmia*. The skin around is reddened, mucous membrane becomes livid, and slightly œdematous. The exposed tissues bleed readily when touched. If an operation is instituted, there are unmistakable signs of increased determination of blood to the part. The initiation of the cancer-process in every shape may be compared to the introduction of a foreign body into the tissues, being followed by identical irritative and phagocytic phenomena.

On the skin, epithelioma is most often the sequel of an ordinary wart, which becomes excoriated, and gradually gives place to an ulcer. Or it may attack a chaf or fissure, which gradually widens into an open sore. On mucous membranes the growth commences in a warty or papillomatous excrescence, only in a minority of instances. Ordinarily a casual fissure, crack, or excoriation forms the antecedent of the disease-process in these also.

As epithelial cancer may be aptly regarded as the type of the cancers in general, so its characteristic sore more or less epitomises the features of every malignant ulcer. The edges are hard and congested; in a mucous membrane, livid. In chronic cases, portions of the circumference are undermined, others everted; some of it may be somewhat warty and bossy

in appearance, but these characters are wanting in the more acutely progressive cases. The outline is irregular, the primary sore is always single. In advanced cases, when auto-inoculation has taken place, or when a large area of tissue has become infiltrated, more than one ulcer may, however, be met with.

The base is red and uneven; it may be granular or comparatively smooth; it always bleeds when touched. A thin sanious discharge exudes, which, unless controlled by deodorants, is always putrescent and insufferably fetid. In small chronic lesions, this when exposed to the air readily dries up into a blackish unsightly scab. Portions of the infiltrated tissues may, from time to time, slough away *en masse*. Ordinarily, epitheliomatous sores present the *excavative* type of cancerous ulceration. Occasionally, especially in the secondary lymph-gland metastases, we find the contrasted condition of exuberant cell-growth, or fungation. More or less severe attacks of hæmorrhage occur from time to time.

Upon removal from the body, the cancerous parenchyma is seen to form a layer of variable thickness, of dull white colour, projecting irregularly into the parts underneath, always relatively superficial. Usually there is a smaller degree of fatty degeneration than in carcinoma, and less fluid *débris* can be expressed from the cut surface. Being not so often or so profusely charged with oil-globules, as the so-called "juice" which is yielded by specimens of the latter, it fails to produce a turbid emulsion with water. Some stress was formerly laid upon this unimportant and inconstant distinction, which has now no value.

Severe *pain* attends the course of epithelioma almost from the beginning, commencing generally as an intermitting neuralgic dart; it eventually resolves itself into two factors: a continuous burning in the open sore, and an intermittent neuralgia referred to the nerve-trunks in the vicinity. The intensity of the latter symptom varies with the abundance and proximity of sensory nerves, compressed or irritated by the malignant infiltration.

The secondary metastases of epithelioma are almost wholly restricted to the lymph-glands near the affected area, or directly in the track of the lymphatics thence proceeding.

The rapidity with which gland-infection takes place, remarkably varies, principally with the locality of the disease. As a general rule it occurs very early, when a mucous membrane is attacked; within a brief period of weeks. On the other hand, in epitheliomatous disease of the skin, it may be delayed several years. The gland or glands in the lymphatic path pass through the three stages previously described; eventually all their lymphoid cells are supplanted by the new epithelial deposit. The supply of blood is cut off, degeneration takes place, inflammatory phenomena supervene. An abscess usually forms, which points and bursts, discharging a turbid, curdy fluid, holding flakes and shreds of dead tissue in suspension, but with little or no true pus. A sinus follows the rupture, exudes a fetid "ichor," and heals but occasionally. The walls of the abscess-cavity collapse, and infiltration of the cutaneous structures ensues; this in turn may ulcerate or slough. A congeries of lymph-glands will thus constitute a hard, bossy, livid tumour, riddled with sinuses, and firmly fixed by implication, both of the skin-covering and of the underlying tissues.

When incised and examined previously to the stage of enlargement, an infected lymph-gland shows the malignant deposit as one or more small whitish islands amid the red adenoid tissue. Later on, the whole of the latter is found supplanted by the new parenchyma; now curdy, and friable in appearance. Still later the gland-capsule will be found filled by the quasi-purulent liquid aforesaid. In addition to the gland-infection, the lymphatic vessels leading from the lesion are seen, in an advanced case, to be completely plugged by the new-growth. They form solid, nodulated cords, filled by a white, crumbling material; of the size of a quill, or even larger. The flow of lymph being thus completely obstructed, the current is diverted into other than its accustomed channels, and glands, lying without the normal lymph-path, become implicated.

When the malignant cells are thus implanted in the lymphoid-tissue of glands, growth is commonly more rapid than in the primary disease-area. "Liquefactive degeneration" more quickly ensues; and an infected gland which has under-

gone increase in bulk is almost always found to be more or less softened. The inflammatory phenomena which attend these secondary deposits—pain, pyrexia, suppuration, septicæmia, &c.—materially contribute towards the fatal termination.

The indications of blood-infection are met with only in exceptional instances; the infective particles being ordinarily to all appearance completely arrested in the lymph-gland stroma. When, however, they reach the blood-current by some means or other, metastases will be found in the viscera as in carcinoma. (See the remarkable case by Mr. Rickman Godlee, quoted at p. 243.) Mr. Poland (*Path. Trans.*, xxxvi.) reports deposits in *liver* and *kidney*, secondary to an epithelioma of the tongue. Mr. Godlee (*ibid.* xxxii) an epithelioma in the bladder, with deposit in the *left lung*; and one on the tongue, with secondary tumours in *liver*, *lungs*, *kidney*, *heart*, *adrenals*, and sub-serous tissue of *diaphragm*. Multiple nodules dotted the integument of the left half of the thorax and abdomen. The disease had apparently infected the sub-cutaneous layer by means of the cervical lymph-glands; a large mass of which existed at the root of the neck, and had perforated the manubrium. Mr. H. Arnott (*Path. Trans.*, xxii.) records an epithelioma of the clitoris, with metastases in *heart* and *lungs*. Sir James Paget (*Surgical Pathology*), one of the lower eyelid, with secondary nodule in the *heart*. Many similar examples are on record.

When a cavity is the seat of epithelioma, *Auto-inoculative* grafts are common in the later period of the disease. In the mouth, minute white islets of malignant epithelium are seen to dot various spots on the opposed surfaces, where there can be no suspicion of infiltration by contiguity. They eventually ulcerate, but do not conspicuously conduce towards death. The aphthous condition of the mucous membranes common towards the end of most cancerous diseases appears to promote, by preparing the soil. A more striking example of the same occurrence has been quoted at p. 6. The causes of epithelial cancer may be summed up as *mechanical friction applied for some time to an unhealthy mucous or cutaneous surface*. In exceptional cases, the disease follows sudden violence, producing some breach of continuity; but the frictional

element is superadded. In by far the most instances, some casual crack, fissure, or ulcer precedes. By this channel, detached surface-cells gain access to the parts beneath, and there become grafted in an abnormal site. This is a natural experiment, daily witnessed. When epithelial-cells are concerned, nothing more appears necessary for the establishment of the cancer-process.

To effect this cell-implantation in sub-mucous or sub-cutaneous tissue, some impairment of vitality is essential. Thus, the fissure does not readily heal, and time is permitted for the cells to establish themselves in their new bed. Hence a young and healthy mucous membrane or skin is but very rarely the seat of epithelioma; those tissues in the old being its usual prey. Old *syphilitic* lesions on the mucous membranes are a very common starting-point. *Chronic alcoholism* has a similar effect upon the alimentary tract.

The parts most attacked by epithelioma are those in which the conditions above described—casual breach of an unhealthy surface and long-continued friction—most obtain. Such are the mouth, tongue, lips, and pharynx, of males; where the mucous coat is commonly chronically deranged from one or other of the sources mentioned, and where excoriations by sharp stumps or projecting teeth are prone to occur. The prolabium is extremely liable to fissures; is also, in men, irritated by pipe or cigar; hence the frequency of epithelioma on the lips. The margins of the anus and vulva often crack, and are subsequently irritated; so with the edge of old scars. Chronic ulcers on the legs or elsewhere are occasionally attacked; not very seldom, the disease has been found in a sebaceous cyst, which has suppurated and ruptured.*

In a minority of instances, the epithelial cells succeed in reaching the sub-mucous or sub-cutaneous tract without any breach of surface. A local overgrowth of epithelium or epidermis arrives at an identical result, merely by virtue of its redundancy. These are the cases in which the cancer is preceded by a papilloma or wart; by *ichthyosis linguae*; by a

* Warty intra-cystic vegetations have been noticed (case by Mr. Butlin, *Pathol. Trans.*, xxvii.); and it is possible that epithelioma may occur in an unruptured cyst of this species.

corn or callosity. It is not always safe, however, even in these, to conclude that some minute fissure may not have been antecedent.

Even of warts, all are not equally dangerous in view of eventual malignancy. Those on the face, being subject to ablutionary friction, are more often the source of epithelioma than those on the trunk; and papillomata about the genital organs are very prone to cancer from a like cause. The small, crumbling, scabby wart, easily detached, and often unavoidably torn off with exposure of a raw bleeding surface, is peculiarly apt to terminate in this disease. Such consists of little else than redundant epidermic cells, loosely attached to the *cutis vera*.

The effect of tobacco-smoking in generating this cancer-variety, appears almost entirely mechanical; any casual excoriation or fissure being directly irritated, and precluded from healing by the particular implement resorted to by the smoker. Some allowance must, however, be made for the furred and coated state of the mucous tract exposed to contact with the fumes; as when the disease commences in the floor of the mouth. In the case of soot and of petroleum, chemical agencies are at work in addition to the mechanical; certain carbon-products exerting a specially noxious influence upon epithelial cells. (See p. 275.)

Dissemination by the sub-cutaneous tissue, not uncommon in some cancer-species, is rare in epithelioma. A case by Mr. R. Godlee (*Trans. Path.*, xxxii.) has been already referred to. In the same publication (xiv. 240), Dr. W. H. Dickinson describes another, secondary to an epithelial sore of the *glans penis*, in a man of seventy. There were multiple tumours on the integument of various parts of the body, with deposits in heart, lungs, liver, a kidney, bronchial, mesenteric, lumbar, and inguinal lymph-glands.*

In exceptional instances, the cervical lymph-glands,

* This case derives considerable practical importance from the fact that the source of these extensive lesions was *concealed*. The patient sought advice for the skin-tumours only, and although in hospital a fortnight, the sore under the prepuce was only discovered at the autopsy. A light is thus thrown upon many published examples of various malignant growths in pathologically impossible situations.

secondarily infected by lip-epithelioma, do not soften and rupture ; but pass into a chronic cystic stage. Of this nature appear to be cases of "Cystic Epithelioma in the Neck," reported in the *Path. Trans.*, xxxviii.; three by Mr. Quarry Silcock, two by Mr. Treves. If, as I have had occasion to notice, the primary lesion has been removed years before, and the patient is ignorant of the causal association, the source of the cervical tumours may escape detection, unless the lips are carefully examined ; when a minute scar will indicate their real nature.

The "Crateriform Ulcer" of Mr. J. Hutchinson (*Path. Trans.*, xl.) begins on the face as a papule, which in a few months attains a prominence of half an inch or more. It has a rounded base. It subsequently breaks down in the centre, and a relatively deep excavation results. The growth contains the "ordinary elements of epithelial cancer mixed with the changes of chronic inflammation"; and appears to differ only from average epithelioma in having been subjected to special irritation.

According to the same observer (*Path. Trans.*, xxxix.), the long-continued administration of arsenic in large doses induces a general dryness and earthy discoloration of the whole integument ; with patches of psoriasis on palms, soles, elbows, &c. Some of these develop into epitheliomatous sores, which may be symmetrical. No specific influence in the superinduction of epithelioma, which may follow any chronic irritative skin-lesion, appears attributable to the drug. The diseases named after Kaposi and Dühring (pp. 196, 197) illustrate a similar sequence.

CHAPTER II.

CARCINOMA.

Definition.—Cancer originating in the epithelioid cells of acinar secreting glands.* (Plate II.)

This prevalent form of malignant disease is, *par excellence*, the cancer of the female sex, and, of all varieties, contributes most to swell the mortality statistics. It may attack any acinar secreting gland, including those tubular follicles which, by branching, approximate to the alveolar type of structure. The great majority of malignant uterine and mammary lesions rank in this category. As in the female breast, the mode of causation and clinical phenomena of carcinoma are more open to observation than in any other organ, it will be convenient first to discuss its manifestations therein, as the most apt exemplar of carcinomatous developments everywhere else. We find here the same pathological process give rise to tumours of two well-marked types; between which, however, as extremes, occur numberless gradations in structure, and in outward appearance.

I. *Scirrhus Carcinoma of the Mamma: Syn. Scirrhus.*

Definition.—The chronic type of breast-carcinoma.†

In the growth and career of the familiar "scirrhus cancer,"

* There can be no advantage, but much the reverse, in describing the cancer-product of surface-epithelium as "squamous-celled carcinoma." The ordinary mode of causation of an epithelioma, and the details of its clinical career, present such significant differences in detail from those of a carcinoma as here defined, that it is important not to lose sight of the valid distinction between the two.

† The word "scirrhus" is derived from *σκιρσος*, a piece of marble, and was formerly assigned to any malignant growth which displayed extreme

considerable diversities of detail are encountered in individual instances. When, as most often happens, the disease commences within the parenchyma, and not in a surface-erosion, its inception is always insidious. A slight induration of the breast-substance is found, either within a few weeks of some mechanical violence, or under the conditions less likely to excite suspicion, to be subsequently described. It is hard, ill-defined, blending with the normal tissue, giving rise to very slight and intermitting sensations of uneasiness in the part.

Even these may be absent, and the first circumstance to excite attention may be the casual discovery of a small, hard nodule or "kernel" intimately connected with the healthy parenchyma, yet now constituting a very distinct tumour-formation. The little growth is freely movable, is faintly tender on pressure, and prolonged manipulation is followed by a sensation of "ache" for some hours. At irregular intervals, varying from two or three days to as many weeks, a peculiar neuralgic dart through the part is felt. It is sudden and severe, is followed by another period of perfect absence of any malaise. Not seldom, the occurrence of this characteristic symptom first leads to the discovery of a tumour, previously unsuspected. With the characteristic induration is usually, but not invariably, conjoined a certain amount of puckering and retraction of the surrounding parts, most obvious when the tumour is relatively superficial.

When removed at this early period and incised, the new growth is found to be of "gristly" consistence. The divided surfaces are yellowish-white, gelatinous, dotted by minute greyish specks. On slightly squeezing, tiny soft caseous pellets are dislodged from these punctæ. The surface of the section is very commonly slightly concave, being depressed in the middle with edges somewhat elevated. The parts immediately surrounding the tumour are always unduly vascular; but the little mass itself appears free from blood-vessels. No capsule is present, and the diseased area is not distinctly marked off from

hardness to the touch. Hence, although most often used in connection with the mammary gland, it was also vaguely applied to other lesions, of divers pathological species, elsewhere. In this work it will be employed solely in the restricted sense above.

the healthy parenchyma. The new-growth is an infiltration, and the impression conveyed to the eye is as though the affected tissues had become suffused by some gluey material.*

The typical scirrhus "kernel" long grows almost imperceptibly. After a period varying very considerably in individual cases, but generally of eighteen months or two years' duration, a marked and rapid increase in its rate of progression becomes manifest, and all unpleasant sensations become greatly aggravated. A considerable increase in the vascularity of the parts bordering on the tumour becomes manifest; and this hyperæmia may eventually pass into actual inflammation. The mass and its environs become red, swollen, and tender to the touch; the temperature may be slightly raised. The growth, if previously deep-seated, has by this time approached the surface, and has become adherent to the skin. In addition to its larger size, it now betrays one or more regions which are soft to the touch, and at which fluctuation can be felt. Removed in this shape, the more central parts of the mass are found to consist of shreddy *débris*, easily broken down; with which is commonly mingled much extravasated blood. Except where the quasi-abscess is "pointing," the peripheral portions of the malignant parenchyma still retain their almost cartilaginous hardness; and when cut by the knife, often emit a perceptibly creaking noise.†

When the morbid growth is left to its natural course, these degenerative processes quickly develop the stage of ulceration. In the case of a small superficial deposit, the adhering skin is primarily coarse, wrinkled, and leather-like; dotted everywhere by little brownish spots, the widely distended apertures of the hair-follicle; and somewhat brown or dusky in colour. It subsequently becomes livid; and, in one or more places, smooth and shining. It eventually cracks in one or in several places; or a slight excoriation may be developed simply as the result

* I have, however, met with cases in which a carcinomatous development deep in the parenchyma has been everywhere regularly invested by healthy though tough and fibrous gland-substance, of equal thickness, and simulating a capsule.

† When scirrhous attacks some pre-existing tumour-formation, as commonly a cyst, the characters of the new-growth are correspondingly modified.

of absorption. The cracks may discharge, and then long remain covered by a black adherent scab; or may cicatrise over; or may enlarge at the circumference, and to a slight extent in depth, becoming true ulcers. Such sores are commonly "atrophic" in their course; they not seldom heal over partially or wholly.

When, on the other hand, a large mass of cancerous parenchyma softens, a quasi-abscess is seen to form. Should there be several boggy, fluctuating areas, they previously coalesce. This points, and bursts like an ordinary abscess, discharging a fetid sanious viscid serum, mingled with curdy shreds, but no true pus. A sinus remains for a short time; but the skin, everywhere penetrated by the eroding cells, speedily disappears, giving place to an open ulcer.

The *ulcer* of a scirrhus carcinoma presents very diverse characters in different cases. Ordinarily it may be said to bear a certain degree of relationship to the histological development and functional activity of the organ attacked. Thus, elderly women, with small shrivelled mammae, present either a sore of the "atrophic" type, little more than an excoriation; or their breasts do not ulcerate at all. Conversely, those in the prime of life, with well-formed breasts, are much more liable to exuberant fungous growths; and the most painfully repulsive cases of this class are seen when a cancerous mamma ulcerates, under the stimulus of pregnancy. The average scirrhus sore is often circular, but not seldom irregular in shape; it has a tolerably even floor of vascular granulations, prone to bleed; it exudes a fetid "ichor." There is a thick indurated base; the edges are hard, and of a dusky livid character; they may be undermined and everted, but do not so commonly present these features as an epitheliomatous ulcer. Large portions may slough. I have known the whole gland-substance of the breast, or what appeared to be the whole, thus decay and become detached, as a solid mass the size of a man's fist—from beneath its covering of infiltrated integument.

Exceptionally a chasm is found, several inches deep, passing through the entire thickness of an average female breast, with the muscle-substance beneath for its floor; yet narrow in pro-

portion to its depth and length, with a relatively very thin layer of indurated tissue around its borders, and with few deposits in the surrounding skin. In this rather rare form of scirrhus ulcer ("cavernous scirrhus," as it has been designated), malignancy has begun in the wall of, or in immediate proximity to, a previously existing non-malignant cyst, of some size; hence, when the latter has been laid open by ulceration, the inordinate depth.

In place of the superficial erosion, or the somewhat deeper (yet still shallow) excavated ulcer, which are most often associated with chronic breast-carcinoma, we find, in a substantial minority of cases, an attempt at "fungous" growth. It is never so well-marked as in the acute variety, and even the resulting protuberance more or less partakes of those characters of insidious halting slowness which distinguish the clinical career of scirrhus cancer. From some part, usually a-centric, of the sore, proceeds a prominent, livid, bossy tumour. It may be single and homogeneous, or divided by deep fissures into several lobes. It is not hard, but of moderately firm consistence. The surface may be superficially excoriated, or may present several distinct shallow ulcers, which bleed from time to time. It is not covered, however, by the exuberant vascular granulations which are seen with encephaloid carcinoma, and the hæmorrhage is not large in amount, unless, as often occurs towards the termination of the case, a large portion sloughs. Very often a thin layer of cicatricial tissue covers the whole mass, which is then smooth and shining. Increase in bulk is slow. Eventually, what was once an excavation, may be wholly occupied by such a tumour, around the base of which is the usual characteristic border of infiltrated integument, hard, corrugated, of dusky-purple colour. Neither the progress of the invading cells in the deeper tissues, nor their tendency to affect the lymph-glands, appears in any way influenced by the development of a "fungous" protuberance.

As soon as a scirrhus mass approaches and adheres to the integument, the lymphatics, blood-vessels, and lymph-spaces of the cutis and of the sub-cutaneous tissue become charged with malignant cells. The skin thus directly involved becomes hard and brawny, dotted with the open mouths of the hair-follicles.

Shortly, at some little distance, one or more islands of secondary deposit appear as tiny nodules. When first noticeable, these are of the size of a pin's-head; they may eventually attain the size of a bean, are rounded and flattened, slightly elevated, environed by seemingly healthy skin. They are firm to the touch; when well-developed are pale and waxy-looking, with a raised border and shallow central depression, circular or oval; the otherwise pale surface is marbled by several blood-vessels, as tiny streaks of vivid red. At an earlier period of growth the whole is often of a bright rosy hue.

The *cutis* may be the starting-point of these nodules; more often, however, they arise in the subcutaneous tissue, by the proliferation of malignant cells or nuclei arrested in the lymph-spaces, in lymphatics or blood-vessels. There being an abundant plexus of these in the subcutaneous tissue, wider diffusion rapidly takes place, the appearance of a single little prominence being soon followed by that of more. The growths may become very numerous, and may be dotted over the scalp and extremities as well as the trunk. The skin immediately surrounding the nodules at first appears, to sight and touch, healthy; eventually an area of variable extent becomes indurated and brawny, being everywhere permeated by the cancerous parenchyma. In extreme cases a large portion, or even the whole of the integument covering the thoracic wall, becomes thus infiltrated. The condition has been described as "cuirass" scirrhus, and the impediment to the respiratory movements thus resulting, of necessity greatly enhances the sufferings of the unfortunate patient.

Secondary deposit in the lymph-glands of the adjoining axilla take place at a very early date in the clinical course of scirrhus carcinoma; it is rare to meet with a case in which some actual *enlargement* of these organs has not already taken place. The chain of lymph-glands behind the lower border of the *pectoralis major* muscle, and in immediate contact with the thoracic wall, is the first to receive infection; subsequently those in the deeper recesses of the axilla. Thence the sub-clavian glands are attacked; and next in order, those situated immediately above the clavicle. Several large glands being

placed, amid a thick plexus of lymphatics, upon the brachial vein, it is common in advanced cases to find that large blood-vessel completely encircled by a hard ring of scirrhus parenchyma. Edema of the corresponding arm is thus produced by rigid constriction of the vein, combined with embolic plugging of the lymphatic vessels. When the obstruction to the flow of blood is complete, the limb becomes hard, brawny, and of gigantic size.

Moderate obstruction in the lymph-glands suffices to mechanically produce *embolic plugging*, followed by *regurgitant currents* in the afferent lymphatic vessels. Hence the lymph-glands near the posterior border of the axilla, which normally do not appear to receive any of the lymphatic excretion of the mamma, become diseased soon after those at the anterior border, which lie in the direct course of the current. When the contents of the axilla are surgically removed, it is a common occurrence to find a chain of hard nodules, often extremely minute and no larger than a pin's-head, running up from the axillary to the subclavian glands, and very firmly embedded in the fascia covering the inferior surface of the pectoral muscles. Later on, these nodules, at first distinct, are found to have become a single, hard, nodular cord. Deposit in the supra-clavicular lymph-glands is, in the writer's experience, invariably accompanied by implication of the like organs in the mediastina.

Deposit in the glands lying higher up in the neck, along the sheath of the carotid vessels, is a rare event, which I have only once noticed. In that instance the patient subsequently died with two large scirrhus tumours in the cerebrum. The case was reported in the *Lancet* of October 3, 1891, by Mr. Cecil F. Beadles, then house-surgeon at the Cancer Hospital.

By the junction of the thoracic and the right lymphatic ducts with the subclavian veins on either side, the contents of the lymphatic vessels mingle with the blood-current, and henceforward the malignant particles may be carried to, and may become lodged in, almost any organ in the body. The lungs are, of visceral organs, the most frequent seat of secondary scirrhus growths; next to these, the liver.

In addition to the evidence of cancerous particles circulating

in the blood-stream which the presence of distant metastatic deposits affords, the patient's whole condition in the later months of scirrhus carcinoma is suggestive of grave deterioration in the blood. Conjoined with a peculiar sallowness and pallor are often conjoined emaciation and extreme physical weakness, in a much higher degree than can be accounted for by the palpable amount of disease, by the interference of the latter with the vital functions of important organs, by septicæmic absorption of fetid discharges, or by pyrexia. The state of these unfortunate women was formerly considered so distinctive as to have been designated by a special phrase, now obsolete—the "cancerous cachexia." All the above-named factors contribute to produce it; but the principal causation-element is the deposit of malignant cells in the bone-marrow. (See p. 66.)

Until scirrhus disease is considerably advanced—*i.e.*, until the growth, roughly speaking, has been noticed for at least a year—the infection extends by way only of the corresponding axilla. Sooner or later, however, the growing mass becomes adherent to the fascia covering the *pectoralis major* muscle, and acquires a new channel of diffusion. Small nodules of deposit now make their appearance, both in this fascia and in the muscle-substance beneath. The lymphatics accompanying the intercostal and internal mammary arteries convey cell-particles to the glands with which they are in association; whence the disease spreads to the like organs in the anterior mediastinum, probably by this time already infected by way of the neck.*

The *breast on the opposite side* becomes cancerous in a minority of instances. Walshe describes both organs as implicated in $\frac{1}{10}$ cases. This is, however, decidedly under the mark. Statistics are unreliable, partly because the infection of the second often manifests itself but a short time before death;

* The lymphatics of the neck freely inosculate with those of both posterior and anterior mediastina. The supra-clavicular glands, as above stated, become enlarged, subsequently to those in the axilla. When obstructed by deposit, the ordinary course of the lymph is altered or even reversed, the valves apparently becoming incompetent. Hence the association, referred to on the previous page, of disease above the clavicle, with intra-thoracic deposit.

partly because the whole breast-tissue undergoes diffuse infiltration; and, as there is no distinct tumour, the condition often escapes recognition.

The phenomenon is always a late symptom, long subsequent to implication of the axillary lymph-glands; always associated with marked deterioration in the general health, and commonly with indications of widely spread marrow deposits. Both the palpable features of the secondary deposit in this region and its clinical course differ notably from what has been affirmed of the primary tumour-formation. Instead of the small isolated, hard, knotty tumour, covered by puckered and indurated integument, which we have described in the latter case, we find the opposite mamma undergo a diffuse and nearly simultaneous infiltration of its whole parenchyma. The entire organ becomes firmer to the touch, and heavier, yet without anything approaching the marble-like consistence which has conferred on the cancer its distinctive name. It then slowly enlarges; the skin-covering is from the first less easily pinched up from the gland-substance than should normally be the case, and becomes infiltrated *pari passu* with the latter, never exhibiting that localised adhesion at a single spot which is first noticed in most instances of the primary cancer. The lymph-glands in the axilla subsequently become enlarged. No puckering takes place, and the nipple does not become retracted.

Ulceration of a secondarily implicated mamma is exceptional. The second breast ordinarily continues to the end a massive, unsightly, indolent tumour. Some pain may be felt, but this never becomes extreme; and, so far as outward signs may be relied on, the condition has but little effect either in enhancing suffering or in shortening life. The axillary lymph-glands remain equally indolent. Little hyperæmia is visible, and the new-growth does not, as a rule, "soften" to any appreciable extent. It would seem as though, by the time the secondary breast-implication is found, some degree of tolerance of the malignant cell-growth, by the system, had become established.

Three possible channels by which the cancerous particles

pass to the opposite breast may be enumerated. Infection may take place :

- (a) By means of the lymphatics and blood-vessels of the subcutaneous tissue ;
- (b) By means of cell-particles which have entered the general blood-current ;
- (c) By the lymphatics of the thoracic wall.

Of these the most important path is that by the abundant lymphatics and small blood-vessels of the subcutaneous tissue—a particular favourable vehicle for the wide diffusion of cancer. In the tract of skin intervening between the two mammae, nodules are often found prior to the implication of the second. In the writer's *Clinical Notes on Cancer* an interesting case is described, in which the patient, whose left breast, with some softening axillary glands, had been removed for advanced scirrhus disease, subsequently exhibited reappearance in the cicatrix, with deposit in the right breast. A chain of small nodules extended from the left axilla *across the back* to that on the opposite side ; and this had seemingly been the road which the malignant cells had pursued. The very late period at which secondary deposit in the opposite breast occurs, and the usual co-existence of indications of marrow-infection, render it impossible to exclude probability of the occasional passage of cancer-particles by channels *b* and *c* as well as *a*.

The small hard "lump" above described, is found only when the circumferential portions of the gland-parenchyma are first attacked, or when the organ is of small size. Under many circumstances, the early appearances differ widely from the above type. Thus, when the process begins at the very core of a large mammary organ, the characteristic hardness on palpation is long wanting. The little mass is completely enveloped either by healthy parenchyma, or by this intermingled with fat ; and until it attains considerable size, all that can be distinguished is an ill-defined thickening and solidification of the gland-substance. The lactiferous ducts (or acini in juxtaposition with these) at the root of the nipple may be the first seat of the lesion ; then, unless the organ be ill-

developed, the nipple becomes gradually retracted, and neither induration nor tumour-formation can at first be felt. More commonly, however, the disappearance of the nipple is accompanied by an ill-defined induration around its base. Cancer may commence in outlying portions of the mammary tissue, leaving intact the remainder; the tumour may thus appear to originate in the thoracic wall, rather than in the breast. In many women the mammary parenchyma is prolonged over the lower edge of the pectoralis major muscle into the axillary space. Scirrhus beginning here, may be remote from the visible breast, and may seem to spring from the axillary lymph-glands.

Any irritation or irritative condition about the *nipple* is prone, in women of mature years, to terminate in scirrhus cancer. Sudden violence may develop malignancy here, as elsewhere in the breast. The combined pressure and friction of tight stays is a common cause; any bad habit of pulling or handling the nipple may have a similar result. In such cases, there is not necessarily any prior breach of surface continuity; the malignant process begins either within the structure itself, or amid the lactiferous ducts deep in the breast-substance. Chronic ulceration, commonly owning syphilitic origin, often precedes, and simple cracks or excoriations, from whatever source, have an identical effect. Scirrhus sores, arising in or on the nipple itself, seem to be worthy of some clinical differentiation from similar lesions elsewhere on the mamma. They have always, in my own experience, progressed much more slowly than the latter, have longer remained localised, and have been amenable to surgical measures of treatment at a later stage. The abundant fibrous tissue of the nipple furnishes a plausible explanation of their relative chronicity.

The "cancer-juice," on which much stress was formerly laid as a feature of cancers in general, is a thick turbid liquid, which can be scraped from the cut surface. It consists of minute oil-globules mixed with cells and cell-débris, is most abundant when there is fatty degeneration and when the growth has reached an advanced stage, is absent from very fibrous and atrophic tumours and from scirrhus generally in its earliest periods. It diffuses readily through water. Except as

an indication of degenerative processes having commenced, no importance can be attached to it.

A rare condition of the nipple and areola, which ultimately leads to scirrhus, was first described by Sir James Paget, and is commonly known by his name. *Paget's disease* essentially consists in an "irritative hyperplasia" of the sebaceous follicles in the region cited; it is probably induced by a tight or ill-adjusted corset. A superficial ulcer covers the nipple and areola; the nipple in time disappears, leaving a shallow concavity; the margins are not indurated. A thin viscid discharge exudes which, on exposure to the air, dries into a scab. When this is removed, the base of the ulcer is seen to be studded with numerous tiny papillæ of a bright strawberry-red colour. The malady lasts for many years, and is rarely, if ever, cured by any measure short of radical extirpation of the offending tract. In the end a malignant tumour is generated deep within the gland-substance of the breast; on removal this is found to exhibit the microscopic characters of scirrhus.

Paget's disease is often termed "eczema of the nipple," but has nothing in common with ordinary eczema. Other ulcerative states of the part are often mistaken for it; in particular those of syphilitic origin, which are here generally serpiginous, and which may efface the nipple in much the same manner.*

The florid little granulations, suggestive of a raspberry or strawberry, which stud the base of the sore, are pathognomonic of the true Paget's disease, and no lesion of the part can be thus correctly designated without that credential. The ulcer, moreover, is central, extending uniformly over the nipple, or over the place previously filled by that structure; the pathological conditions which simulate it commonly extend unevenly and irregularly over the areola.†

* Hence, perhaps the one or two recorded cases of cure by simple local applications must be regarded with suspicion.

† In the past fifteen years I have met with only two cases which could with certainty be identified as Paget's disease. I believe the condition to be much more rare than the published accounts would lead us to suppose. For an account of its minute anatomy, see the monographs of Wickham and Darier. Some of the resulting tumours have been described as "Duct-Cancer" (p. 110).

Of late years, special interest has been attracted to Paget's disease, by Darier's discovery in connection therewith, of certain bodies reported to be micro-organisms. Such are found in great numbers within the cells of the epidermis and its prolongations; and are stated to belong to the order of coccidias or porosperms, in the class Sporozoa.

These bodies are asserted to be the cause of Paget's disease; and the fact is thus supposed to favour the idea of a parasitic origin for cancer in general. No evidence has so far been adduced to prove that they are the source of Paget's disease; nor that they are associated with that malady to the exclusion of other ulcerative conditions of the nipple. And even their microbic nature is still a matter of doubt. By Dr. Thin, and other competent observers, they are considered nothing more than "degenerate epithelial cells"; the most probable view.

In a considerable number of instances, a scirrhus growth is found in association with one or more cysts. Apparently either of the two lesions may be the progenitor of the other. (See p. 114.) Most commonly, however, a primary cyst of long standing is attacked by malignant disease; probably by reason of its interference with the normal involution of the gland-tissue, when the fruitful epoch of woman's life has passed away.

The microscopic appearances of scirrhus carcinoma may be styled, so far as the arrangement of the cells is concerned, a *replica* of normal histological breast structure. Just as the latter is made up of epithelioid cells, arranged in acini, and built up on a skeleton framework of dense fibrous tissue; so we find the new-growth constructed on precisely similar lines, the essential difference being an enormous superabundance of acini relatively to the fibrous stroma. The character of the cells is also profoundly modified.

If we take thin sections of a small scirrhus, at the earliest period feasible, we find that the cells of several contiguous acini have transgressed their borders, and are encroaching upon the environing stroma. They have passed beyond the limiting *membrana propria* into the inter-fascicular spaces; where they are seen to be actively multiplying, breaking down the cohesion of the connective-tissue fibrils, and everywhere insinuating themselves along the lines of least resistance. When fully

developed they are found to have ranged themselves in alveoli; the shape and dimensions of each alveolus depend on the characters of the original tissue-basis, upon which the new-growth has become moulded. Thus the cancer-cells growing in an inter-fascicular gap develop into an acinus, whereof the length greatly exceeds the width; and cells in a lymph-space into one of irregular shape. When fatty tissue is the site, the cells congregate at the angles of the interlacing fibres, gradually crumpling up the larger fat-cells within; the acini thus formed are round or oval, and constitute the most typical feature, in a thin section, of a scirrhus neoplasm. Wherever secondary deposit is found—lymph-glands, viscera, bone-marrow, cerebrum, &c.—this peculiar tendency of the cells to group themselves in acini, more or less resembling those of the healthy mamma, is their most distinguishing characteristic.

The alveolar stroma of scirrhus carcinoma is the connective-tissue framework of the part filled with the new cells, and is nothing more. All the phenomena, clinical as well as microscopical, result from the proliferation of these cells. There is no adventitious development of new fibres; hardly even hypertrophy of the old.*

Thus the puckering and wrinkling of the integuments ensue from the tension placed upon the fibres of the connective-tissue by the growing masses of cells in the interstices of that structure. These haul upon the fibres, as a sailor makes taut a rope. Retraction of the nipple when the lactiferous ducts are implicated is a physical sign of precisely similar mechanism. The peculiar hardness which these tumours exhibit to the touch is caused by cell-proliferation within the meshes of dense rigid bands, or under a resisting envelope. The absence of pain in the early stage, and its severity in the later, largely depend upon the degree of tension

* As chronic inflammatory processes commonly involve some connective-tissue hypertrophy, the above statement may demand qualification to a slight extent. Cancerous deposit in any tissue partakes of the nature of a foreign body, and stirs up a certain degree of inflammation. Hence, it is not impossible that in very chronic breast-carcinoma the fibrous basis may increase in amount. But such overgrowth (even if it actually takes place, of which there is no evidence) is plainly due to the secondary inflammation, and does not result from the direct development of the cancer.

which the stroma thus undergoes before it breaks down before the invading cells.

The cells of the carcinoma as compared with the normal glandular epithelium are greatly increased in size. They tend towards an oval or spherical shape. Instead of the small central nucleus with single nucleolus like a small dot within, we find the principal nucleus disproportionately huge, and placed more or less to one side. Moreover, the majority of the cells contain more than one nucleus, many even nine or ten; and each nucleus contains two or three nucleoli, in the form of highly refracting vesicles. These nuclei are studded throughout the cell-protoplasm without any regularity of arrangement, and become numerous in proportion to the microscopic power employed. Thus, while a low power may display but a single nucleus, a medium (one-fifth or one-sixth) will show three or four; a one-twelfth, double that number, and so on.

With an average adhesion by the majority to the round or ovoid type, many corpuscles of the new growth vary from that standard in shape and in dimensions. Some are pear-shaped, or extremely irregular in outline, or resemble a club; there may even be a few fusiform or oat-shaped. There are plenty of small nuclear bodies, usually regarded as "free nuclei." Oil-globules occur both within and without the corpuscles; there is much amorphous *débris*.

The appearance of the cell-elements of any malignant growth, as seen in a prepared thin section, is misleading; they are then shrivelled and altered in form, partly as a result of the preparation-media, partly from age. If the cut surface of a fresh specimen be scraped in the old-fashioned way, and the "juice" mingled with a drop of water faintly tinged with gentian-violet, the scirrhus cell is seen under the microscope as a finely granular mass, with no differentiated wall. When several such are found aggregated together, their separate outlines cannot be clearly distinguished.

The higher the power used, the more torn and irregular the periphery; the body of the cell appears as though it were a soft fringe of jelly-like material adherent to and enveloping the nuclei. Usually one or two of the latter are much larger

than the remainder, which stud the entire body of the cell, and seem to be in various stages of development. Some present a clearly defined outline, and are readily tinted by the ordinary dyes; others, with a less distinct boundary, are less easily stained; and in these two particulars every gradation is exhibited, down to small hazy areas which can only be distinguished with difficulty under high powers of the microscope. The cells range from $\frac{1}{1000}$ th to $\frac{1}{700}$ th of an inch in diameter; the average being $\frac{1}{1200}$ th to $\frac{1}{1000}$ th (Paget). The long diameter of the principal nucleus is about $\frac{1}{2500}$ th of an inch.*

There is not so marked a tendency to the formation of large vesicles of fluid in the nuclei ("vacuolation") as we have noted in connection with epithelioma; but the same condition also occurs, only in a less conspicuous degree. Scattered granules of pigment are sometimes found either in the cells themselves, or lying free between these. Pigmentary degeneration, however, rarely occurs in scirrhus carcinoma on an extensive scale; though, to the naked eye, small extravasations of blood often simulate it. Occasionally the numerous nuclei with their adherent protoplasm are seen under the microscope as large compound cells, somewhat resembling myeloplaxes. The phenomenon, however, is at best but an exaggeration of that multiplication of nuclear bodies which every carcinomatous cell more or less exhibits; and in the absence of any clear differentiation of outline, it is not always clear whether what we behold should be most correctly described as a single cell, or as a congeries of such. The nuclei are equally diffused in the pale granular protoplasm-area; there is not that heaping-up of nuclear bodies in a limited portion thereof which characterises the giant-cells of tuberculosis.

Degeneration speedily attacks the cells at the core of each malignant acinus, where they are oldest, and most removed from the blood-supply, as from the healthy tissues. The periphery of the acinus or alveolus is always occupied by the most recently formed cells, which are readily stained, and which have no difficulty in procuring nutriment at the expense

* It is probable that, as Fleming states, some of the so-called nucleoli are merely nuclear fibrils seen in transverse section.

of the normal structures around. The middle is filled by cells, whose nuclei either entirely resist the action of dyes, or receive coloration in only a modified degree. There is also here more or less abundant cell-débris. The degenerating cores of the alveoli constitute the tiny greyish specks which stud the cut surface of every scirrhus tumour; and which are readily squeezed therefrom as caseous pellets. In advanced specimens degeneration is found upon a much more extensive scale; numerous acini with the intervening remnants of normal tissue having undergone "liquefactive degeneration." Such appear under the microscope as a heterogeneous mass of débris containing cell-fragments, and detached nuclei mingled with shreds of fibrous tissue, abundant oil-globules, red corpuscles, and crystals of cholesterine.

The tissues immediately bordering on the part tenanted by the malignant acini betray very marked indications of hyperæmia. When divided by the surgeon's knife, there is an abnormal amount of hæmorrhage, and many more blood-vessels require the ligature than would be the case in a healthy organ or structure. Under the microscope, all the vessels appear profusely engorged, the lumina being filled by masses of cells. The connective-tissue stroma is diffusely infiltrated with leucocytes, and numerous aggregations of the latter are seen. With these are commingled small young carcinomatous nuclei. The area which presents these features was somewhat unfortunately designated by Virchow as the "indifferent granulation material"; and the cells occupying it, whether leucocytic or carcinomatous, termed "indifferent cells."*

The hyperæmic area, thus improperly regarded as a distinct tissue, is the region occupied by the vanguard of the invading cell-army. It is the area of impalpable cell-development, as opposed to that of the palpable; which latter constitutes the tumour we see and touch. It gradually becomes studded with malignant acini (in the case of breast carcinoma), and thus undergoes conversion into the visible neoplasm. The existence of this environment to infiltrating species of cancer,

* Pathologists of a profane turn of mind were wont to describe the above as "John the Baptist" tissue, because it is the forerunner of the actual tumour-formation.

accounts for the non-success of many operations, and needs due allowance in any surgical procedure for the extirpation of that disease.

The cases of so-called "Atrophic" scirrhus demand notice here, as in many points they appear to constitute a remarkable exception to ordinary ideas and average rules concerning that disease, and have even been described as a distinct species, under the name of *carcinoma fibrosum* (Müller). The subjects are invariably exceptionally spare, elderly women, whose breasts have either from the beginning approximated to the male type, or else have undergone senile atrophy in an extreme degree, without any concomitant deposit of fat. Hence the organ primarily consists of little else than shrunken lactiferous ducts and fibrous tissue, the latter enclosing a very few minute acini. Scirrhus of the male breast corresponds, in its clinical and histological phenomena, to "atrophic" scirrhus in the female.

When malignancy ensues in such a manner, the inhibitory influence of tough fibrous tissue is specially marked. The cancer to the end remains very small, hard, and shrivelled-looking. Under the microscope, characteristic scirrhus acini are seen blended with a relatively inordinate amount of firm and solid-looking fibrous basis. There is little or no hyperæmia of the parts around; indications of degeneration are scanty.

Ulceration, in the most typical instances, never occurs at all. In a few, some very transient and superficial excoriation may take place, which rapidly again cicatrises over. Deposit in the axillary lymph-glands makes its appearance very tardily, and metastatic growths in the viscera only after the lapse of many years. The growth in the breast and lymph-glands causes but slight pain, and contributes little to affect the duration of life. Unless meanwhile resulting from some intercurrent disease, a fatal termination is usually ultimately brought about by secondary deposits in the viscera. It is, however, often delayed for remarkably long periods. An existence of ten to fifteen years after the first discovery of the lesion is by no means rare. Two out-patients of mine, in whom no sign of failing vigour was apparent, ascribed a duration of more than twenty years and thirty years respectively to their complaint. Marrow-

infection is usually absent, a circumstance which aids in accounting for the chronicity of these cases.

At the earliest stage at which a mammary carcinoma can be microscopically examined, we find the cancer-process confined to a very small group of contiguous acini. The remainder of the parenchyma shows only indications of normal involutionary changes, mingled, it may be, with signs of past sub-acute inflammation, such as minute areas of induration or of caseous degeneration. Ordinarily, it appears perfectly healthy to the naked eye. At the cancerous focus, however, the epithelioid cells are found to have transgressed their proper boundaries, and to be freely proliferating in the enveloping connective-tissue stroma. Whether the initiation of malignancy first affects the cells, or whether there is a rupture of the *membrana propria*, can only be matter of conjecture. In cases following traumatism, however, there can be little doubt that the latter has occurred. The breach of surface-continuity which leads to epithelioma affords an obvious parallel. There can be no question also of the importance of preceding subacute inflammatory or irritative conditions in leading to cancer, though it is impossible to recognise any true "pre-cancerous" stage.

The mode in which the epithelioid cells (now become carcinomatous) multiply, is not wholly clear. An irregular form of mitosis has been described by Hausemann. The numerous nuclei are seen to be undergoing division, sometimes symmetrical, more often into several segments of unequal size. From the very varying size and degree of development which they moreover exhibit, and from the manner in which, under high powers of the microscope, they are seen to stud the protoplasm of each cell, it would seem that any portion of the latter may undergo differentiation into a nuclear body. This eventually becomes an independent unit, enlarges, separates from the parent cell, and in turn gives birth to a fresh progeny of cell-organisms on the lines of geometrical progression.*

The *causes* of scirrhus are referred to in Chapter VII. Its practical aspects are discussed in Part III.

* I have occasionally noticed, under the microscope, appearances lending colour to the spermatic theory, according to which, all the cells or nuclei of

II. *Encephaloid Carcinoma of the Mamma.*

Synonyms.—Soft cancer. Medullary cancer.*

Definition.—The *acute* form of the cancer-process in mammary parenchyma. (Plate III.)

Cancerous tumours, which are aptly designated by the somewhat antiquated title "encephaloid," appear, if possible, still more insidiously than those of the preceding type, and progress far more rapidly. They occur, as a rule, deeply in the breast-tissue; in their incipient form, are ill-defined indurations or small "kernels" resembling the early scirrhus growth. Unless obscured by fat, there is a moderate degree of hardness to the touch. With the quick progress of the tumour, this character disappears. The disease is often absolutely painless in its early stages, and, even when far advanced, causes but slight suffering when compared with the chronic variety. The difference has been accounted for by the absence of tension in the tissues, which become the prey of encephaloid carcinoma.

Sensations of heat in the part are complained of early, and from the beginning much more conspicuous hyperæmia is outwardly apparent than in scirrhus. The tumour quickly increases in bulk, and implicates the skin-covering, which then shows marked lividity. The classical inflammation-signs—pain, heat, redness, swelling—are present, with slightly elevated nocturnal temperature. As the mass now has become soft, "boggy," and fluctuating, it may bear considerable resemblance to an ordinary abscess.

The livid surface-area soon points, and bursts, with discharge of the usual curdy cancer-débris, but little true pus. A considerable portion of the skin breaks down, and disappears;

tissues invaded by a cancerous growth, in turn become cancerous, and proliferate accordingly. But I have never been able to fully satisfy myself on the point; in every malignant lesion the distinguishing characters of the cell-species whence this has sprung conspicuously predominate.

* The word "encephaloid" was formerly applied to any cancerous growth of soft and "brain-like" consistence. Hence, it included cancers of several distinct species, and the same objections to its employment as in the converse "scirrhus" exist. As conveying an important clinical distinction, it is here retained for mammary carcinomata only.

thus a large and deep ulcerated cavity is formed, from which begins forthwith to sprout a highly vascular mass of "fungous" granulations. From this frequent bleedings take place; which, with the profuse fetid, sanious discharge, soon sap the patient's strength. From time to time, large portions slough away. The rupture of the quasi-abscess will have reduced tension and abated the inflammatory phenomena, thus affording considerable relief to the patient. Singularly, little pain often accompanies the most repulsive-looking sores.

While the ulcer widens, the malignant infiltration extends as rapidly in the deeper parts, which appear to offer little resistance to its advance. In turn the healthy gland-substance, the pectoral muscles, the ribs, and other structures of the thoracic wall, become implicated and eroded. To some distance also from the disease-area, the integument is now seen to be marbled over with little clusters of blood-vessels, and dilated veins, often of considerable size, ramify over the front of the chest, &c.

While in the severity and character of the pain subjectively complained of by the sufferer respectively from acute and chronic carcinoma in this region, a striking objective difference is found in the behaviour of the axillary lymph-glands. While in scirrhus, these very early manifest increase in bulk, and often subsequently outstrip in growth the primary lesion, we now find little until the breast-sore has attained huge dimensions. Outward signs of deposit in the corresponding axilla may long be wholly wanting. In average cases the lymph-glands increase to a slight extent, then remain quiescent, or grow but very slowly, until a late period of the disease.

There can be no doubt, however, that these organs early receive infective particles, although the subsequent development of these may remain temporarily in abeyance. Occasionally, they proliferate as vigorously as in chronic carcinoma. Ordinarily, the rule is that their rate of progress varies inversely with that of the primary tumour. After excision of the latter they quickly advance, even when previously betraying no increase beyond the normal size. In consequence of the inconspicuous gland-infection which characterises many of

these cases, the new-growth has often been diagnosed as a sarcoma.

In this acute cancer-process, *blood-infection* takes place early, and is the source of very numerous and widely scattered metastases in the viscera and elsewhere. *Wide dissemination by the subcutaneous connective-tissue* is a fairly common event, the trunk and limbs becoming dotted with secondary nodules. *Marrow-infection* occurs, and not seldom to a conspicuous degree, producing soft prominent tumours in various parts of the skeleton ;* *per contra*, in scirrhus, it is most often "insidious."

Cysts, as in scirrhus, are often associated with encephaloid carcinoma. So far as I have seen, they appear in the latter to be of secondary formation, and due to the obstruction caused by the cancer-parenchyma. It is rare to meet with an acute mammary carcinoma in which there is a history of previous nipple-discharge, or long-standing quiescent tumour.

When incised, the encephaloid tumour presents a coarsely granular surface, of an opaque ashy-grey colour. The mass is soft and easily broken down with the finger; the section exhibits no central concavity, the minute caseous pellets and stringy outlying cords of the latter are wanting. We find a rounded distinct tumour, not an irregular infiltration of normal stroma, without distinct demarcation from the healthy parts around. Instead of these being, as it were, dragged into the substance of the cancer, the latter pushes these before it. Thus the integuments, instead of being drawn in and wrinkled, are distended. No retraction of the nipple takes place; indeed, it may be doubted whether the acute form of carcinoma ever commences among the lactiferous ducts where tenacious fibrous

* *Non-insidious Marrow-infection.*—For permission to quote the following I am indebted to my colleague, Dr. Purcell:—Mildred W. was admitted into the Cancer Hospital on Jan. 15, 1883. There was a malignant growth noticed for previous twelvemonth, in the left breast, with enlargement of the axillary glands. Two soft elastic bosses grew from the left half of the sternum. A few months afterwards similar tumours appeared on the left scapula, the left parietal bone, and the shaft of the right femur. The latter bone was spontaneously fractured shortly before the patient's death, in November 1883. The microscopic appearances were those of encephaloid carcinoma, exuberant proliferation of epithelioid cells, with scanty stroma. There were macroscopic deposits in the lungs and kidneys, microscopic ditto in the marrow.

tissue is abundant. It may be noted that the ashy-grey colour, the coarsely granular section-surface, and the friability of encephaloid cancer are associated with any form of acute malignant cell-proliferation. They are thus common to several species of cancerous new-growth; for example, to lympho-carcinoma, to some sarcomata, to secondary deposits of melanotic cancer, in which pigment is not superabundant, and to retinal glioma.

Of degenerative processes, there may be little evidence to the naked eye until the mass has attained considerable bulk. We then find considerable portions undergoing "liquefactive degeneration," and at the same time abundant blood-extravasations are commonly seen. There is a much more manifest tendency to cell-decay upon a large scale than is the case with scirrhus growths, where the minute degenerating areas long remain almost microscopic.

A thin section of encephaloid carcinoma examined under the microscope varies in appearance, according partly to the place in the tumour from which it has been taken, partly to the stage of development and to the degree of degeneration present. Thus the central portions of these growths consist of little else than cells, with here and there a few strands of white fibrous tissue derived from the normal stroma of the gland. There is here little trace of the locular arrangement so typical of scirrhus carcinoma, and, when the disease is advanced, large masses of the new cells are found either converted into heterogeneous débris, or obviously on their way towards that necrotic change. If a diagnosis be arrived at from an examination of such central sections alone, the neoplasm may be regarded as a sarcoma.

When, however, a thin section from the periphery is placed under the microscope, no matter whether the tumour be recent or advanced, abundant evidence is usually forthcoming that the acinar epithelium is the mother-tissue of the cancer. Characteristic acini are marked and plentiful, and it is seen that the new cells of the acute, as of the chronic, carcinoma first develop in this form, before the intervening framework of the part becomes eroded by the new cells. Relatively to an average scirrhus section, the alveoli in a given space will probably

appear more numerous, the bands of healthyfibrous tissue smaller and thinner; there will be more plentiful leucocytes and engorged blood-vessels, and the cell-growth far more exuberant relatively to the investing stroma.

If we turn to the individual cells, we may find a smaller average size, a more hazy outline, and a greater superabundance of free nuclei scattered about the section. Almost every cell and its nucleus are, moreover, copiously laden with tiny oil-globules, and far on the way to fatty degeneration. Otherwise, the description of scirrhus cells applies in every respect to those of encephaloid carcinoma.

In spite of the considerable difference which obtains in the microscopic phenomena of the typical scirrhus, and the typical encephaloid carcinoma respectively—still more, in the naked-eye appearance of the several tumours—the pathological process is in each perfectly identical in substance, varying only in degree. Between the two extremes, every gradation is found.

Whether a mammary carcinoma shall be acute or chronic, would seem to be mainly a question of histology. The gland varies enormously in structure, not only in different individuals, but in the same person at different periods of life and under special circumstances. The degree in which the breast is developed, the activity of the circulation within it, its functional activity, are all conditions to be taken into account; but the principal determining influence appears to be exercised by the fibrous-tissue framework. According to the tenacity of the fibrous-tissues, and the resistance which these present to the attack of the invading cells, does the tumour become acute or chronic, of the "soft" or "hard" type.*

Hence relative youth favours acute developments of mammary carcinoma; extreme age, the converse. A young woman with well-formed, functionally active mammae, and a vigorous circulation, if unfortunately attacked by cancer, is likely to develop a tumour of the encephaloid type; and the most acute cases of carcinoma are seen in association with pregnancy.

* Every operating surgeon must be particularly conscious of the extreme variations in consistency presented by the fibrous connective-tissues of different individuals, in operations on the breast and axilla.

On the other hand, an atrophied breast never becomes the seat of typical "soft" cancer; and males are wholly exempt. Even with an organ of average structure and composition, a similar variation is noticeable. A carcinoma commencing within the nipple, or its root, is always specially chronic in its career.*

III. *Carcinoma (Non-mammary).*

When the parenchyma of secreting glands other than the mamma develops cancer, the two distinct types of tumour-formation which have been described in that organ no longer occur. And any particularly hard, or particularly soft, new-growth within the body, more commonly appertains to some other pathological variety than that here in question. Hence it is preferable, in recording cases of non-mammary carcinoma, to employ the generic title without prefix.

Arising in organs of relatively soft, cellular, and non-fibrous structures, the tumours ordinarily constitute soft, often tuberculous cell-masses, with scanty stroma. Outwardly they are white or greyish-white in colour. The cut surface is granular, ashy-grey, variously mottled by degeneration-areas, or by the results of extravasation. Microscopically, the cells exhibit the same indications of exuberant fertility as those of mammary carcinoma; several huge, eccentric nuclei, with numerous smaller ones, in various stages of growth. Amid an enormous crowd of cells, small and scanty bands of fibrous tissue are seen; the evidences of degeneration are abundant, and the usual indications of hyperæmia are very conspicuous.

The size, and, to some extent, the relative distribution of the cancerous cells, vary with those of the healthy cells whence they are derived. The new retain, in a somewhat aberrant form, the functional endowments of the old. Thus, an ovarian carcinoma is generally commingled with cyst-formation; the cysts containing fluid-materials corresponding with those which characterise the healthy organ, and which abound in its non-

* On the cyclic cell-changes in the mammary parenchyma, which occur at the menstrual periods, and which render the organ specially liable to cancer during its involution-stage, see *The Proclivity of Women to Cancer*.

cancerous neoplasms. In the liver, as in the case cited at p. 14, the malignant parenchyma may continue to secrete bile. In carcinoma of the thyroid, cysts and loculi filled with the secretion peculiar to that gland, abound amid the cell-collections.

In the earlier period of growth, a certain degree of acinar arrangement is, moreover, apparent in thin sections of the tumour. It would be vain, however, to look for the type of construction which prevails in mammary carcinoma; in which the cancer may be described as a malignant counterfeit of the normal breast. The cells of the non-mammary lesion, however, speedily permeate, in a much more irregular fashion, the recesses of the tissue they encounter. Hence a microscopic section of the latter will commonly display but a heterogeneous infiltration, with little or no appearance of acini.

From the functional importance of the organs involved, from their vascularity and cellular composition, and from the usual absence of inhibitory fibrous tissue, the disease in question usually advances rapidly, and proves quickly fatal. The tumours are much more often marked by softness and friability than by the opposite extreme; and the cancer-process here more closely approaches the encephaloid type of breast-carcinoma, than the scirrhus. A development parallel, either in course or in outward semblance, with the "atrophic scirrhus" of the mamma, is unknown in any other secreting gland.

In the main phenomena of its clinical career non-mammary carcinoma resembles its acute mammary prototype. Infection of the blood takes place with rapidity, proportionate to the facilities for the admission of cell-particles into the circulating current; in the case of visceral organs, generally at an early stage.

The adjoining lymph-glands are similarly implicated, ordinarily within a very brief period; but on a free surface, as within the bladder or the uterine cavity, where local cell-growth occurs luxuriantly, it may be long retarded. Under the same condition, the opposite extremes of *excavation* or of *fungous protuberance* may be found, the latter eventually giving place to the former. With an excavated ulcer, extensive

deposit in the lymph-glands may be looked for; with a tumour in the exuberant stage, there will probably be scanty and inconspicuous metastases in these structures.

Somewhat infrequently the cells gain access to the marrow of some contiguous bone by direct infiltration, with the result of multiple bone-tumours; but that insidious infection which has been described in breast-carcinoma is not known to occur.

Auto-inoculation is common, under favourable conditions. When a free surface is the site, as the mucous membrane of the bladder, or, less often, the mucous glands of the intestinal tract, or when the growth ruptures into a cavity—*æ.*, cysts of the ovary, Fallopian tube, or parovarium—multiple grafts occur in this way.

For reasons discussed elsewhere, the uterus shares in the special proclivity of the female mamma to cancerous developments, and the great majority of its malignant lesions must be referred to the secreting glands of its endometrium. A considerable number of cancers in the testis are of the same species, which is not uncommon in the kidneys. (See pp. 274, 321.) But in most other glandular organs—*æ.*, the liver, the pancreas, thyroid, mucous and salivary glands, &c.—malignant developments are relatively exceptional. The exemption of such from carcinoma may be plausibly explained—in part, by the manner in which their situation shields them from mechanical injury or irritation; in part, by their retaining till the end of life their functional activity; whereas mammary, uterine, and to some extent ovarian carcinomata exemplify the general tendency of structures which have become become effete to cancerous devolution.

IV. *Intra-cystic Vegetations, Proliferous Cystic Growths, Duct-Cancer, Villous Cancer.* (Plate III.)

In individuals past or passing middle age, cysts containing fluid are very liable to a peculiar development, of malignant nature; consisting in soft, vascular cell-masses, which sprout as vegetations from one or more points in their lining membrane. The phenomenon is most commonly seen in *intra-mammary*

cysts, formed by the retention of fluid within dilated acini or ducts. It is frequently met with in the ovary, whereof the ordinary cyst is a distended Graafian follicle; and in the thyroid body, where it is an exaggerated vesicle of the gland, or is formed by the coalescence of several such. Cysts with non-fluid contents—*e.g.*, the common sebaceous—but rarely develop proliferous vegetations. The varieties which are thus attacked, agree in being retention-cysts, and in the possession of an internal membrane lined by columnar (cylindrical) epithelium. The ordinary mammary cyst (leaving out of sight those rare cyst-formations due to obstructed lymphatics, or lymph-spaces) consists of a dilated duct or acinus; those of the former origin being near the nipple, those of the latter occupying the deeper recesses of the gland. The method of production is mechanical; by some means or other, the effete products not being drained away *per* the lymphatic system, accumulate and distend the little cavity. The contained fluid largely consists of degenerate cells, which increase in number by continuous shedding of the columnar cell-lining. This is particularly apparent in cysts formed by dilated acini; such are found deep within the gland-parenchyma as primary formations; or occur as secondary ditto, environed by redundant fibrous tissue, in the tumours known as Cystic fibroma, Adeno-fibroma. In a microscopic section, masses of effete cells are seen adhering to various parts of the cyst-wall, and filling its recesses. The locality and fragmentary condition of these indicates that the lumen of the cysts was once occupied by similar parenchyma, detached in process of preparation, if the former be small; broken down for the most part into mucoid fluid, if the cyst be huge.

In young women, the mammary cyst is usually single, and is near the nipple, and is formed by a distended milk-duct. In those past middle life, the cyst is commonly multiple, and more often of acinar origin. With one large, there are several smaller; and the whole gland-tissue may be profusely studded with microscopic cysts. The appearance might be described as "cystic degeneration of the mamma," and is analogous to the similar condition in the ovary. Seemingly, the lymphatic drainage is inadequate to carry off the cell-débris, under

the undue stress thrown upon it by the involution of the gland. It is important, for practical purposes, to point out that a cyst in the breast of a young woman is a purely local matter depending on some local obstruction; but that such in an elderly female is but an evidence and result of involutionary changes affecting the entire parenchyma.

Hence a very significant difference in the clinical behaviour of these two cyst-formations. A cyst in a young woman's breast does no harm beyond the disfigurement it involves, until the functional activity of the organ begins to decline. A similar tumour, commencing in that of a female who has reached the involutionary period, is seldom found without abnormal cell-growth, proliferous vegetations, from its walls. A parallel distinction between solid connective-tissue tumours of the female mamma at different ages is elsewhere pointed out.

The vegetations are of two species:

- (a) The most common are sprouting masses of cells, derived from the columnar cell-lining; and hence characterised by a similar shape and distribution. These must be classed with the *carcinomata*.
- (b) Less often, they consist of connecting-tissue, sometimes organised, sometimes highly embryonic; or of spindle-cells with little tendency to organisation. Those of the latter type are *sarcomatous*.

The carcinomatous vegetations, supposing that the cyst is excised at an early stage of their growth, appear as small, brownish-red, vascular tufts, sprouting from the cyst-lining, commonly multiple. At this period they are analogical to villous papillomata of the bladder, which they conspicuously resemble to the naked eye. Placed under the microscope, they display a "congeries of complex branching spaces, lined by columnar epithelium";* with the usual collections of leucocytes, and similar indications of cancerous hyperæmia. Developing on a free surface, within a tenacious cyst-wall, these intra-cystic carcinomata gradually increase until they form bulky, lobulated masses filling the entire cyst-cavity, from which the former fluid-contents will have become gradu-

* Shattock.

ally extended by excentric pressure. We then find a solid mass of cancer-parenchyma without a trace of fluid; but still enclosed within a capsule, composed by the cyst-wall. There is not the tendency to early enlargement of lymph-glands which characterises extra-cystic carcinoma.

In a still later stage, the capsule is eroded; the axillary glands are enlarged; the adjoining structures, including even the ribs, are infiltrated;* and the clinical career of the neoplasm is parallel to that of ordinary carcinoma.

Intra-cystic carcinomata are commonly described as "duct-cancers." They also constitute the "villous cancer" of Cornil and Ranvier. The title is open to criticism, as implying that they arise from the epithelioid lining of the lactiferous ducts. Many of the cysts in which they occur are dilated acini, not ducts; and the particular shape of the epithelioid cells as pointed out at p. 157 is an accidental peculiarity, varying in different conditions even of the same organ.

The malignant nature of these vegetations is proved by their occurrence in advancing age, and during the involution-period of the mamma; by the microscopic appearances, and the characteristic hyperæmia; by a similar mode of causation to that of ordinary carcinoma—sometimes a blow, sometimes mental distress, &c.; by the parallelism of the later stages with those of scirrhus or encephaloid cancer. The difference of their earlier phenomena is due to their mode of development on a free surface. Their early appearance as elongated papillomatous or villous processes, followed later by cell-infiltration at the base, is exactly paralleled by that of similar growths in the bladder (*q.v.*).

The second form of intra-cystic vegetation is intrinsically *spindle-sarcoma*. That composed of well-organised fibrous tissue is equivalent to a benign fibroma; but, if uninterfered with, will eventually pass into a malignant stage of embryonic tissue-formation. The tumours are localised, and do not infect the axillary lymph-glands, except by direct invasion. The new tissue grows slowly until the fluid

* See case reported by Mr. Shattock, *Path. Trans.*, xlix.

is wholly absorbed, as in the corresponding carcinoma; the whole mass then consists of multiple lobules, enveloped in a thick capsule. The cyst-wall is next eroded; the overlying integument becomes tense, and finally ulcerates; a luxuriant "fungous" mass sprouts forth, constituting the "fungating adenoid" tumour of the older writers. This, if unrelieved, proves rapidly fatal by frequent attacks of hæmorrhage; microscopically, it reveals the characteristic appearances of the spindle-sarcoma.

Cysts may become *secondarily* associated with carcinoma or sarcoma in various ways. The obstruction which the growing tumour mechanically produces, may give rise to dilatation of ducts or acini in the vicinity; or an acinus, or cluster of acini, enclosed within the thick wall of a cyst, may undergo carcinomatous development. Secondary cysts of this character are not usually proliferous.

Intra-cystic sarcomata and carcinomata both involve considerable pain, due at first to the tension of the cyst, later to necro-biotic changes. It is not usually possible to diagnose, before removal, the variety of cancer in any particular cyst, unless lymph-gland infection (by the carcinoma) has already taken place. There is usually a history of quiescence and of perfect ease up to a certain date; then of pain, rapid enlargement, and increased vascularity, which is consequent upon traumatism or some special trouble.

The malignant cyst-formations of the ovary and thyroid are analogous to those of the mamma, except that connective-tissue vegetations are less commonly met with, and the new-growths are of the carcinomatous type. There is a greater abundance of fluid; the tumours, especially ovarian, may reach a huge bulk. The ovarian may undergo colloid degeneration, the thyroid show abundant secretion of the peculiar secretion of that gland. The warty projections from different parts of the cyst-wall eventually coalesce so as to enclose numerous irregular spaces lined by columnar epithelium. Malignant cysts in the broad ligament commonly arise from the parovarium, and are examples of that tendency to the

cancer-process common to all vestigial remnants.* (See Blastoma.)

* The same law is illustrated by dermoid cysts of the ovary, which frequently display malignant features, in particular, *auto-inoculation*. In Fraenkel's case (*Wien. Med. Wochenschrift*, 1883, p. 865), a woman aged thirty-seven fell and ruptured an abdominal tumour which had been noticed two years. There was peritonitis and rapid increase. At the laparotomy the tumour was found to be a dermoid cyst. The surface of the peritoneum was occupied by very numerous small pedunculated growths of the same nature, and larger ones were attached to the liver, mesocolon, and diaphragm. From the omentum hairs were found sprouting. Similar instances have been reported by Grawitz (*Virchow's Archiv*, Bd. c.), Matthews Duncan (*Obstet. Trans.*, xxiv.), Moore (*Path. Trans.*, xviii.), and Hulke (*Path. Trans.*, xxiv.).

CHAPTER III.

SARCOMA.

Definition.—Cancer originating in the cells (corpuscles) of the connective-tissue.

Although a cancerous product of the universally distributed interstitial tissues may appear in any region of the body, most sarcomata are found to spring from the following parts, ranged in order of frequency :

- (a) The periosteum of bone.
- (b) The interstitial connective-tissue, particularly that of the intermuscular spaces.
- (c) The bone-marrow.*

Of the three leading groups into which the class of structures in question is divided—fibrous connective-tissue, bone with dentine, and cartilage—the two first are much more liable to cancer than the last.

The term “sarcoma” is often vaguely applied to any soft and cellular malignant tumour, with scanty fibrous stroma. Cancerous growths which of old would have been recorded as “encephaloid” or “medullary,” are now commonly recorded under the more modern designation; their source and real pathological rank being lost sight of. Many of the malignant lesions thus designated would, from the history and microscopical evidence, appear to have sprung from secreting gland-

* Although the marrow is intrinsically a “vascular connective-tissue, richly loaded with fat” (Huxley), its functional attributes would seem rather to assign it a place amid the lymphoid or adenoid tissues.

cells (*carcinoma*), from the lymphoid cells (*lympho-carcinoma*), or from fetal residua (*blastoma*).*

The principle that the cancerous offspring of each tissue bears a generic resemblance to its parent, is of universal application to malignant neoplasms; being obscured only by degenerative-processes, as in the case of colloid carcinoma. The true sarcoma may need identification by the examination of microscopic sections taken from MORE THAN ONE PORTION of the tumour. Its proper badge is the *presence in marked abundance of embryonic, fusiform, oat- or spindle-shaped cells*, arranged for the most part in bands. Scanty and scattered cells of this type may be found in the thin section of almost any malignant tumour. It is their predominance in considerable tracts of the new-growth which stamps the latter as a sarcoma; or as belonging to the nearly allied group of the Myo-sarcomata (p. 143).

Hence a cancerous tumour cannot be correctly described as a "sarcoma" unless:

- (a) It consist wholly, or in great part, of embryonic spindle-shaped cells.
- (b) Or, as with periosteal outgrowths, the possibility of other tissues than the connective being its source, can be confidently excluded.

Without appeal to one or other of those tests, the tissue-source, and therefore the pathological rank of the cancer, must remain undecided.†

A true sarcoma is distinguished from all other cancers by the clinical peculiarity of not secondarily infecting proximal lymph-glands *per* the lymph-currents. Metastases in these organs are found only in conjunction with numerous others in the viscera, or other parts distant from the primary seat of disease; and under conditions which indicate either:

- (a) General blood infection; or
- (b) Invasion of lymph-glands by contiguity of tissue.

* For this reason, the class of growths described hitherto as "round-celled sarcomata" is here omitted. The tumours placed therein will be found on more accurate investigation, to fall into one or other of the remaining divisions.

† Even the anomalous quasi-malignant tumours of cartilage may emit metastases of spindle-celled tissue (p. 124).

The typical cancer-product of connective-tissue cells or nuclei, is the "Spindle-celled Sarcoma." In its best marked examples, this throughout consists of fibres and bands composed of spindle-shaped cells, which have undergone a partial organisation. In effect, particularly when we have reason to regard the cancerous symptoms as consequent upon an antecedent benign tumour-foundation, and as therefore of reversionary character, considerable portions may present under the microscope appearances in nowise differing from that of normal fibrous tissue.

In other instances, we find large areas of the thin section, or even of the gross tumour, occupied by round or oval cells in shape and dimensions resembling the nuclei of the embryonic spindle-cells. They appear, in fact, to be these nuclei proliferating as independent cells. There is a much lower tendency to organisation than in the preceding; but a certain degree of banded and regular arrangement is rarely, if ever, wanting. Growths of this description may be classed as "Mixed-celled Sarcomata." In the pathological scale measured by relative organisation, the "benign fibroma" appears at one end, the "mixed-celled" sarcoma at the other.

These two constitute the primary varieties of cancerous growths from connective-tissue. As the result of modifications in the basic spindle-celled structure certain secondary species occur. Such are the "osteoid sarcoma," in which a spindle-celled base undergoes higher organisation into imperfect bone; the "melanotic sarcoma" and "chloroma," in which peculiar degeneration-processes prevail; the "myeloid sarcoma," in which giant-cells are mingled with the spindle-celled tissue; and the somewhat doubtful "alveolar sarcoma." (See also the "mixed" myxoma, p. 188; intra-cystic vegetations, p. 113.) Nerve-tissue is liable to a tumour-formation, known as "glioma," ascribed to its delicate neuroglia.

The exciting cause of a primary cancer-process in connective-tissue is usually *traumatism, sudden and transient*. The great majority of sarcomata are preceded by a blow, fall, or slight contusion; a sprain or undue muscular effort. Slight soreness or aching, often hardly noticeable, follow; this soon passes off, but in a few weeks the tumour makes its appearance.

Presumably a slight rupture of fibres or fasciæ takes place ; whatever the exact nature of the lesion, the tissues in question sustain damage. Restoration of the healthy *status quo* is precluded by the subsequent movements of the part. Thus an irritation parallel with that which is seen to produce epithelioma.

Occasionally a repetition of slight injuries may generate sarcoma ; thus a periosteal sarcoma at the lower end of the femur has been known to follow blows on the knee, in mounting to a clerk's desk. Of a cancer-process in connective-tissue generated by *continuous* irritation, many malignant growths about the alveolar process of the jaws, certain sarcomata of the bladder, prostate, larynx, afford examples ; and thus further bring the mechanism of causation into correlation with that of the cancer-products of epithelium.*

In "reversionary" sarcomata, or in such as come under observation only after the lapse of several years' insidious growth, it is usually impossible to obtain any clear account of the antecedents, and the causes can be inferred only from analogy. A vague application of the term to cancers of various kinds militates against reliance upon the details of many recorded cases. The most satisfactory examples are when a tumour must necessarily have sprung from a connective-tissue, as with periosteal outgrowths.

To the true sarcomata, men from the nature of their avocations are much more liable than women. The parts most exposed to trivial sprains or contusions suffer more commonly than those comparatively protected. The active cell-proliferation normally carried on in the osteo-genetic layer of the

* Whenever a causation-history can be obtained at all, a sarcoma is found to have been preceded by traumatism in one or other of the above-mentioned shapes. Not seldom, however, the memory of the initial injury is obscured by the insidious development of the tumour, and the consequent lapse of time. In my own experience, a sarcoma has rarely followed grave injuries, such as a compound fracture, which would necessitate rest in bed. The patient generally speaks of some trivial knock or contusion, which involved no confinement or incapacity for work, but which, nevertheless, was shortly followed by the appearance of a tumour.

I have never found indications of a neurotic element in the causation of sarcomata. When met with at an early stage, it is very rarely that an account of shortly previous mechanical injury or sprain is not to be ascertained.

periosteum, combined with the liability of certain bones to mechanical violence, renders that membrane a specially favoured site of cancer-growth.*

The familiar "epulis" illustrates sarcoma-production by chronic congestive conditions, in place of sudden injury. These little growths take rise in a portion of the gum chronically irritated by some morbid process in the vicinity, usually a decaying stump. Some are malignant *ab initio*; others are at first well organised, and to be classed as simple fibromata. But in the end these latter, if neglected, pass into true sarcoma-tissue.

The periosteum is the most fruitful parent of sarcomata, the bones most often attacked being the femur, tibia, humerus, and lower jaw. Less often, these tumours attack fasciæ, and the sheaths of the muscles. The intermuscular spaces of the thigh and shoulder are frequently the seat. True sarcomata of the mamma, testis, or internal viscera occasionally occur; but doubt must rest on the nature of many tumours of these parts so recorded, until the several round-celled neoplasms have become more accurately differentiated; and until the vestigial element in tumour-formation has been further elucidated.

Some "polypi" on mucous surfaces are primarily sarcomatous; the mucous lining of the nares and of the uterine cervix is specially liable to such. Others again undergo secondary devolution into a lesion of the same type, beside those which excite epithelioma or carcinoma, by irritating the neighbouring parts. The solid or partially cystic mammary tumours of later life may in like manner revert to an embryonic stage of spindle-celled growth.

Many benign tumours, of the connective-tissue series, specially fibromata and enchondromata, after subsisting for a long period of years as stationary or slowly-growing neoplasms of the former type; tend, as age advances, to become cancerous and to destroy life. For rare instances of the development of malignant phenomena in tissues ordinarily regarded as exempt, see p. 124.

* See tables, p. 304 *et seq.*

I. *Spindle Sarcoma* (Plate IV).

In the intermuscular spaces, or in connection with fasciæ, spindle-celled sarcomata first appear as solid growths, differing in nothing from a benign fibroma. They are smooth, or slightly lobulated; freely movable; firm, or of no pronounced hardness; and painless. They always form distinct and separable tumours, showing no tendency until a late stage to the promiscuous infiltration which characterises a carcinoma. Their progress at first is slow and gradual, but later becomes more and more rapid. They in time distend the overlying fascia. This with the other fibrous structures in the vicinity become thickened, and constitute a more or less adherent capsule. With the tension thus involved, the tumour becomes harder, and is attended by sensations of uneasiness, merging into continuous aching pain.

After a variable period of this insidious phase, the disease takes on more active growth. The capsule or quasi-capsule yields to the eroding cells; the skin and the surrounding parts become blended in a livid, ill-defined mass. The subsequent phenomena, ulcerative and otherwise, are identical with those of acute carcinoma; the ulcer usually fungates. Under different conditions, as in the periosteum or mamma, spindle-sarcomata are from the first conspicuously hard and painful, and their clinical career is more acute throughout. Or sometimes, on the other hand, as pedunculated growths from mucous membrane or skin, they are soft, or only moderately hard, polypi; distinguished from non-malignant members of the latter class by their more marked vascularity. The disease may attack the neurilemma, constituting one variety of the gummata, fibromata, myxomata, &c., which pass as "neuromata."*

On incising such tumours, those of the more chronic type are distinctly separated from their environment by an invest-

* The active cell-changes continuously proceeding in the "osteogenetic layer" of the periosteum, will account for the frequency of a malignant process in association with that membrane, in conjunction with liability to traumatism.

ing capsule. Their surface is whitish, somewhat fibrous-looking; commonly mottled, however, by greyish or yellowish areas of degeneration. Some of these latter correspond to the "liquefactive degeneration" of a carcinoma; others partake of a mucoid character, and approximate in appearance to that of myxoma.

In the more acute, or in those which have reached the acute stage, the basic structure is a soft, granular-looking, friable pulp, white or greyish-white in colour, often mottled by extravasated blood.

Commonly portions of the section are fibrous in appearance, while others are granular. Both are readily broken-down by the fingers. Sometimes the predominant tint is yellow: in others, it is reddish, or fleshy, from excessive vascularity. Sarcomata growing from bone often have a fragile central core of newly formed bone, radiating from the latter in septa; with detached spicules of the same material throughout their parenchyma.

The cell-elements vary in size in different specimens; hence some writers describe a large-celled and a small-celled species of the spindle-sarcoma. They display the usual characteristics of malignancy, containing one or more huge nuclei, with several others smaller and of less definite outline. With a general adherence to the fusiform shape, they often depart slightly therefrom, and seem inclined to revert to a round or oval contour. A banded arrangement always prevails more or less. Sometimes the whole of the tumour consists of fusiform cells, thus regularly distributed and semi-organised. In other specimens, the bands traverse areas of cells seemingly heaped up heterogeneously. It is almost always possible, in a thin section, to trace the gradation from the normal, staff-shaped nuclei of fibrous tissue to the large swollen spindles of the cancerous parenchyma.

Conjoined often with the fusiform-cells are others, of round or ovoid form, collected in promiscuous heaps without definite arrangement. These also spring from the same source; and every shape intermediate between the spindle and the spherical may be observed. The number of the latter ranges from a few scattered individuals to a majority preponderating

considerably over the spindle-cell element, which, however, is never wholly absent.*

In spindle-sarcomata of "reversionary" characters—*i.e.*, when the symptoms of malignancy are developed in a pre-existent tumour which has existed for many years without causing trouble, except from its bulk—the microscopic phenomena accord with the clinical course. Part of the tumour will be found to consist of normal tissue, redundant, but well organised; while part is occupied by the embryonic spindle-cells indicative of the cancer-process. Thus, various intermediate forms between the benign fibroma and the cancerous spindle-sarcoma abound.

II. *Mixed-celled Sarcoma.*

While almost every sarcoma contains, mixed with its spindle-cells, a certain proportion of the round or ovoid cells above described, the term in question may be conveniently applied to tumours in which elements of the latter character preponderate.

Of this type are most of the malignant periosteal outgrowths of long bones. The condition indicates a lower tendency to organisation than when the spindle-celled tissue prevails, and the disease here runs a correspondingly more acute clinical career; otherwise all that has been affirmed of the spindle-celled sarcoma applies equally to the mixed-celled.

The following appear to be examples of a cancer-process in tissues (of the connective order), ordinarily exempt.

(a) *In Fat.*—The following case, which might be styled one of "malignant lipoma," is recorded by Mr. Pick, in the *Path. Trans.*, xx. With the exception of metastases, nothing is wanting to the usual phenomena and history of cancerous disease.

A thin, spare man, aged thirty-six, was admitted into Netley Hospital, for a *sprain of the right ankle*. While in hospital, he

* From these round or ovoid cells it is necessary to distinguish the appearances presented by a band of spindle-cells in cross section. The divided nuclei of the latter are seen under the microscope as irregular triangles, or four-cornered bodies, with outline blurred and hazy.

From the absence of any limiting membrane to the cell-elements of sarcoma, as of other cancers, it is impossible to lay stress upon the presence of an "intercellular substance" as distinguishing sarcoma from carcinoma.

showed depression of spirits and pyrexia, shortly followed by the appearance of an abdominal tumour. He was sent into St. George's Hospital in December 1868, suffering great abdominal pain, frequent vomiting, and "all the symptoms of cancer." He had the usual "aspect of malignant disease," and the case was diagnosed as such. He died in April 1869, about ten months from the first appearance of the tumour. The necropsy disclosed an enormous mass of "pure fat," weighing $29\frac{3}{4}$ lbs., and filling the abdominal cavity. The source whence it grew was not apparent.

A "recurrent fatty tumour" of the spermatic cord, passing into the scrotum, is recorded by Mr. Curling (*Diseases of the Testicle*, p. 559). The "recurrences," three in number, were progressively rapid, and the later tumours were mingled with some "embryonic connective-tissue."

(b) *In Cartilage*.—In a young woman of twenty, a huge mass grew from the shoulder, and proved fatal in about eleven months. With the exception of some bone-spicules, it proved to be cartilaginous throughout. In the *liver* and *uterus* were tumours composed of spindle-celled tissue, with apparently some transition-forms from the cartilage cell. In both limbs were ununited fractures (? narrow-infection). Case by Mr. Marshall, *Path. Trans.*, xviii.

This was an instance of acute malignancy. Similar cases of extremely chronic duration are not uncommon. At the Royal Medico-Chirurgical Society, Dr. T. F. Chavasse reported a case in which he had found it necessary to excise the right humerus, scapula, and outer third of the clavicle for a huge mass of ten years' duration, growing from the upper part of the bone first mentioned. It was considered to be "an enchondroma undergoing some sarcomatous change." In the Cancer Hospital, at about the same time, was a man with a somewhat similar tumour of eight years' duration, under the care of Mr. Jessett. (See also the lecture on "Cartilaginous Tumours" in the *Surgical Pathology*.)

(c) *In Bone*.—A remarkable case of "osteitis deformans," which would seem to exemplify a possible transition from simple exostosis to cancer, is very elaborately detailed by Mr. E. R. Bickersteth in the *Path. Trans.*, xvii. The cranium is shown in the plate to be studded within and without by large irregular masses of dense, ivory-like bone, everywhere permeated by large vascular canals. The disease commenced in a boy at the age of fourteen, and proved fatal at *ætat.* thirty-four. There were similar outgrowths, of date subsequent to the cranial tumours in the *hyoid bone*, and a *fibula*.

The huge ivory-exostoses, which occur about the orbital cavity, and prove ultimately fatal, may partake of the same character. (See typical case by Mr. Spencer Watson, *Path. Trans.*, xix.) Death, however, is caused by direct pressure-effects. I have not found record of any such with distant metastatic deposit.

CHAPTER IV.

SUB-VARIETIES OF THE SARCOMA.—GLIOMA.—OSTEOID SARCOMA.
—CHLOROMA.—SPINDLE-SARCOMA WITH GIANT CELLS.—
ALVEOLAR SARCOMA.

I. Glioma.

Definition.—Cancer of the neuroglia.* (Plate XII.)

The most frequent seat of gliomata is the *retina*. Less often the *brain*, and still more rarely the *spinal cord*, have developed malignant tumours of this species, and such a growth has been found in the auditory nerve. In the retina the disease makes its appearance only during infancy and childhood. Elsewhere it conforms to the usual rules of cancer-age, being most prevalent (though relatively uncommon) in the later decades of life.†

The tumour is ordinarily of an ashy-grey tint, and is of firmer consistence than healthy brain-substance. Its colour may, however, be modified by vascularity, or by effused blood, and parts may have undergone degenerative softening. Thus

* Although the glioma (γλῖα, glue) is universally regarded as a sarcoma derived from the cell-elements of the neuroglia, it may be doubted whether tumours springing from other sources have not been included in the designation. Thus, Virchow has recorded a case of tumour-formation by the ganglion-cells, and probably such are more common than has been supposed. Again, Dr. Sims Woodhead (*Manual of Pathology*) describes a non-malignant "glioma" which does not infiltrate adjoining tissues or emit metastases. The causation of these probably various morbid growths is involved in great obscurity. (See remarks at p. 174 and in Appendix A.)

† Hence, valid reason for differentiating the retinal lesions, so styled, from gliomata of the brain or spinal cord.

the cut surface may appear bright red, or of a pinkish white, and may be variously dotted with yellow, or greenish yellow, degeneration areas. Instead of being relatively hard, the tumours may be granular, soft, and pulpy. The surrounding parts are hyperæmic. Ordinarily there is no attempt at encapsulation; the cancerous parenchyma merges imperceptibly into the healthy nerve-tissue. Calcification has occasionally been noticed. There is usually some induration around the palpable tumour.

Under the microscope gliomata are found to consist of very small cells embedded in a basic stroma, which is sometimes granular, sometimes distinctly fibrillated. The former are also granular in appearance, with indistinctly defined outline. In shape they are for the most part fusiform, or present slight modifications of that typical pattern. With many cells, or nuclear bodies which are round or ovoid, there is usually a sufficient preponderance of the former element to indicate origin from the neuroglia. In some specimens the microscopic appearances differ little, or not at all, from those of an ordinary spindle-sarcoma.*

Wherever situate, these tumours grow rapidly, infiltrate the neighbouring tissues, and develop secondary deposits, usually only in the immediate vicinity. The retinal gliomata alone permit operative treatment; the cells are here apt to penetrate along the sheaths of the optic nerves, to the cerebrum on the one hand, to the opposite eyeball on the other.† Hence they rarely fail to reappear after excision.

Retinal gliomata eventually implicate the bony walls of the orbit, and protrude as loathsome "fungous" masses, with

* Dr. W. R. Gowers ("Glioma of the Left Cerebral Hemisphere," *Path. Trans.*, xxvii.) describes the tumour in this case as consisting "of minute angular and fusiform cells, all with delicate dividing processes which could be traced into, and appeared in great part to compose, the intervening basis—a substance." A man, aged forty-six.

In other published cases the growth is described as consisting of minute roundish corpuscles, with no admixture of spindle-cell, and with no approximation to the fusiform shape. Such have probably originated in the nuclear element of the retina, or ganglion-cells of the cerebrum, &c., rather than in the neuroglia.

† For example, see plates of case by Mr. Spencer Watson, *Path. Trans.*, xxii. Also one by Mr. G. Lawson, *ibid.* xxxvi.

hideous deformity. When the retina has become detached, auto-inoculation has been noticed. Detached cells have been grafted on various parts of the choroid with the production of multiple secondary nodules in that tunic.

As a general rule, the internal viscera are exempt from metastatic infection, but secondary deposits in the brain, less often in the spinal cord, consecutive to primary retinal disease, are commonly met with. Virchow records a secondary growth in the liver, and Knapp one in the kidney.

The cancer-process, in the case of gliomata, partakes of the acute type. The growth of the primary lesion is unrestricted by fascia or "capsule" in the soft and vascular nerve-tissue; the cells proliferate rapidly. Death takes place, in great measure, from local pressure-effects, time not having been permitted for metastatic developments in distant regions.

When the brain or spinal cord are found to be the seats of primary glioma, the individual is nearly always well within the "cancer-age." Traumatism, a fall or blow, is, in these, a common antecedent, though the causation-history of recorded cases is frequently very incomplete.*

In the "retinal" gliomata of childhood, however, there can be little doubt of the pre-existence of a congenital element. The disease is most plausibly attributable to the persistence of foetal structures in an embryonic form. It is thus analogous to the Rhabdo-myomata, p. 149. It is very rare after the age of eight years; Berry (*Diseases of the Eye*) assigns that of twelve as the extreme limit.†

The disease often commences during intra-uterine existence. The children are otherwise healthy, and so are their parents. But there is a marked tendency for several children of the same parent to be thus attacked.

II. *Osteoid Sarcoma.*

Definition.—A variety of spindle-celled sarcoma in which the embryonic connective-tissue tends to undergo organisation into bone.

* For glioma of spinal cord and medulla accompanied by syringo-myelus, see *Path. Trans.*, xxxii. (Dr. Whipham). A man, aged thirty-three.

† The malignant eye-diseases of advanced life present the ordinary characteristics of a sarcoma, often melanotic; see p. 327.

The "osteoid cancer" of former writers designated two distinct pathological phenomena:*

- (a) The true "osteoid sarcoma." A malignant tumour, which, both primarily and in its secondary metastases, tends to reproduce the structural characteristics of bone, although in an aberrant and "heterologous" form.
- (b) Calcareous metamorphosis or calcification. The deposit of calcareous salts in a sarcoma or carcinoma.

"Osteoid cancer" was first described by Müller (*Archiv*, 1843). In its most typical form the condition is extremely rare. Most sarcomatous growths from bone or periosteum exhibit, however, a certain degree of approximation thereto, and many chondromata ultimately pass into a similar state of ossification, with metastatic deposits.

From a sarcoma which has merely undergone calcification, the osteoid exhibits the following grounds of distinction:

- (a) It always originates in bone or periosteum.
- (b) It possesses a minute structure, more or less resembling that of normal bone.
- (c) It is generally developed from cartilage, in imitation of the natural process.

The cancerous bone exhibits under the microscope ill-formed, irregular *lacunæ* and *short canaliculi*. Sometimes even Haversian canals are present, but around these we fail to find the regular arrangement of *lacunæ* which obtains in the normal structure. Its quantity varies in different specimens, and even in different parts of the same tumour. It is either yellow and ivory-like, or dull white, friable, and chalky. With it is combined much spindle-celled tissue, and many round or oval cells; giant-cells (myeloids) may also occur. Small areas of cartilage undergoing ossification are here and there apparent.

* Mr. Butlin (*Sarcoma and Carcinoma*) very properly protests strongly against this confusion of terms. He also aptly points out the diverse significations of the still more objectionable "osteosarcoma." "This may mean a soft sarcoma of bone, or a sarcoma growing in the interior of a bone, or a sarcoma which contains bony material, and which grows either from a bone or from the soft parts."

The secondary metastases of osteoid sarcoma, as a rule, closely resemble the primary tumour in structure. They may, however, betray only an admixture of spindle-cell elements, with cartilage; they may consist alone of the former.

The spindle-shaped and round cells constitute the essentially malignant element in this rare form of cancer; which is practically only one of several variants of the spindle-sarcoma, and is subject to all that has been affirmed of that morbid growth. The quasi-organisation of osteoid sarcomata does not appear to affect the tendency of the cell-elements to rapid diffusion, or other malignant phenomena. In the most typical cases, the disease is extremely *acute*. Sir James Paget (*Surgical Pathology*) records an osteoid cancer arising in the pelvic bones of a girl, aged fifteen; which proved fatal in three and half months from the first appearance of the tumour. Müller describes one still more rapid in career.

On the other hand, some examples of the disease are published, in which an exceptionally *chronic* course was evident. Such tumours would probably now be styled "calcifying or ossifying chondromata," rather than "osteoid cancer"; but it appears impossible to draw any strict line of demarcation between the two conditions in question: viz., that in which we find a mass of cartilage, with moderate tendency to bone-formation; and that, wherein cancerous new bone is developed with great rapidity *ab initio*. Thus Sir J. Paget quotes a case of "osteoid cancer" in the humerus of a woman, aged thirty-two. After ten years it was excised, being then 7 lbs. in weight. Four years subsequently, amputation at the shoulder-joint took place, for a "recurrent" growth of 15½ lbs. The disease returned in the scapula; and the patient eventually died, twenty-four years from the first appearance of a tumour.

The acute osteoid sarcomata are from the beginning very painful; probably as the result of tension in an often hypertrophied periosteum. They increase rapidly in bulk; are associated with obvious hyperæmia in the neighbouring parts; and are often found traversed by large blood-vessels. They have been known to pulsate; but that feature is exceptional.

In a case cited by Stanley (*Diseases of the Bones*, 1849) the skin covering the growth, and also its central substance, sloughed away. As in ordinary spindle-sarcomata, diffusion takes place by the blood, and not by the lymphatic system. In the case by Sir J. Paget, above cited, there was a continuous growth of new bony material, passing from the primary pelvic tumour along the common iliac veins into the inferior vena cava. The branches of the right pulmonary artery also contained plugs of the cancerous bone.

The malignant cells tend to diffuse themselves along the medullary canal of the long bones. Hence early blood-infection, and speedy death with numerous metastases, which are specially found in the lungs. Their access to the marrow will account for the extremely rapid course of many cases.

The most favoured seat of osteoid sarcoma is the lower end of the femur; and here it appears to commence very frequently at the junction of the diaphysis and epiphysis. Mr. W. Sedgwick remarks (*Brit. and Foreign Med.-Chirurg. Review*, xvi.): "The primary appearance of osteoid cancer in the femur with its subsequent development in the cavity of the thorax, has been observed in so large a proportion of the cases recorded, that it may be looked upon as one of the most characteristic features of the disease." Of twenty-seven cases cited by Sir James Paget, fifteen began in this part; the *skull, tibia, humerus, ilium* and *fibula*, are each credited with two; in the two remaining instances, the *ulna* and *metacarpus* were respectively attacked. Cases have been reported in which the disease was supposed to arise independently of bone or periosteum; but these do not bear close examination. Thus Müller (*Archiv*, 1843) refers to an osteoid cancer lying loose in the thigh, between the sartorius and the vastus internus, and regarded as the primary tumour until an autopsy disclosed a previously unsuspected growth on the shaft of the femur.

Mechanical injury, in the shape of a blow or fall, seems to be the *exciting cause*, whenever the history has been satisfactorily ascertained. Hence males are more often attacked than females. Of twenty cases given by Paget, fifteen were in males, five in females.

The rarity of well-marked examples of osteoid sarcoma would also seem to indicate that some individual idiosyncrasy must determine the conversion of spindle-celled tissue into ill-formed bone. Speaking of non-malignant osteomata, Sir James Paget (*Surgical Pathology*) remarks on the frequency with which these occur in parent and child; and this observation may well be taken into account when it is sought to explain the development of the corresponding cancer-variety.

The phenomena of *marrow-infection*, at first *insidious*, are shown in the following case, elaborately reported by Mr. W. Sedgwick (*Brit. and Foreign Med.-Chirurg. Review*, xvi.): which will also serve as a typical example of the disease in question:

A pedlar, aged sixteen, came under the care of Mr. Quain in March 1850, for an elongated rounded tumour, firm and somewhat elastic, extending from the upper extremity of the tibia to the commencement of the lower third of the left femur. This was the result of a not very severe blow in the previous January, on the knee. Amputation above the tumour showed a trabecular structure of bony stroma full of large vessels, and containing greyish-red matter in its interstices.

The lad recovered and went about the country for three years as a pedlar with perfect health. In March 1853 he wrenched his right shoulder, in throwing up a heavy bar of iron into a cart; some stiffness and pain followed. A tumour appeared on the right clavicle, grew rapidly; subsequently, hæmoptysis, various chest and head-symptoms. Death in October 1853.

At the autopsy the outer four-fifths of the *right clavicle* were found involved in a double bony tumour. The outline of the bone was still traceable, the compact tissue of the shaft contrasting with the porous structure of the new-growth. Another bony mass grew from the fourth, fifth, and sixth *ribs* on the right side, with their adjoining *vertebræ*. In the lower lobe of the *right lung* was a third containing the bony matter in a "granular" form, with several isolated gristly nodules. A nodulated bony growth in the *posterior mediastinum* involved both the aorta and trachea without diminishing the calibre of the former. The *left lung* contained abundant cavities filled with cells and cheesy matter, but no bone. The posterior lobe of the *left cerebral hemisphere* was occupied by an irregularly globular lobulated tumour containing some cysts, and enclosed in a capsule. It was soft, of an opaque creamy-white colour, contained no bone. The *viscera* of the abdomen and pelvis were healthy, as was also the stump of the left thigh.

In the newly formed bone the microscope showed lacunæ with canaliculi very short, and less clearly defined than those of normal bone; some deposits consisted only of agglomerated granules

embedded in a transparent matrix which here and there displayed a fibrous appearance. The non-ossified brain-tumour was mainly composed of large spherical cells resembling those of "ordinary encephaloid cancer."

The growth of the bony masses by ossification of a previously formed matrix was demonstrated by the condition of the thoracic aorta, which, although embedded in one of these, had undergone no diminution in calibre.

Of nineteen patients referred to by Sir James Paget, five were ten to twenty years of age; nine, twenty to thirty; four, thirty to forty; one, forty to fifty. Sedgwick alludes to a case under the care of Mr. Quain, in a man aged fifty-five. The disease followed fracture of the right thigh, and proved fatal in eleven months, with secondary bone deposits in *pleuræ, lung, diaphragm, and omentum*.

Stanley (*Diseases of the Bones*, p. 165) enumerates three important points useful in diagnosis.

- I. The tendency of the malignant tumour to grow around the lower part of the femur, just above the condyles, or around the upper part of the tibia, just below its head.
- II. Its tendency to assume an oblong rather than that globular form which belongs to many other tumours of bone.
- III. The infected lymph-glands become hard, isolated, movable tumours.

The marrow of the bone primarily attacked becomes infiltrated for some distance beyond the extent of the palpable tumour. Sometimes isolated nodules of the malignant osseous tissue are found scattered throughout its substance; sometimes nearly the whole medulla is found converted into a calcareous or ivory-like rod, which is continuous with the primary tumour, and fills the central cavity of the shaft.

In an interesting case by Mr. D'Arcy Power (*Path. Trans.*, xl. 293), the disease attacked the left femur (near the knee) of a girl aged thirteen, causing death with metastatic deposits of densely hard bony material in a rib, clavicle, pleuræ, lungs, pelvic and left inguinal glands. A large portion of the pelvis was, however, found to be almost *decalcified*; an approximation to the infective phenomena of mammary carcinoma, and singularly

contrasting with that excessive formation of new bone which characterises the disease.*

Sir James Paget (*Surgical Pathology*) remarks of osseous tumours in general: "In no instance can it be plainer than it is in these, that a nosological boundary of 'tumours' must be an arbitrary one." The following case by Mr. Stanley (*Diseases of the Bones*, Case I.) demonstrates the supervention of the malignant process in a tumour primarily benign:

A woman, aged thirty, came under his care with a large tumour of the leg, which had been in existence eighteen years; in the popliteal space were two smaller, hard, movable masses of *recent* formation. The thigh was amputated in its lower third. The exterior of the tumour was found to be composed of soft substance, in parts fibrous, in others "encephaloid." The central portion was "osteoid," some parts cancellous and spongy, others yellow and ivory-like; this was continuous with a similar deposit within the medullary tube of the tibia. The popliteal tumours were probably glands. The stump cicatrised, but chest-symptoms followed, and death took place in two months from the amputation. Numerous isolated ivory-like deposits mixed with fibrous and encephaloid substance, were present in the marrow of the remaining part of the femur. The *femoral*, *iliac*, and *cervical* absorbent glands were converted into similar parenchymatous material with osseous deposits in the centre. Many "encephaloid" growths were present in the *pleura*, *pericardium*, and *lungs*, also a large mass of the same around and within the coats of the *vena cava superior*.

Here a tumour of uncertain nature (presumably an exostosis, as there is no mention of cartilage) grows slowly for eighteen years; then infects the adjoining glands, runs an acute course, with very numerous metastases; and produces death within a few months.

"Ossifying chondromata" furnish many examples of a similar phenomenon; and the chapter on "Cartilaginous Tumours" in the *Surgical Pathology* may be advantageously read for an account of the transition from a benign neoplasm to cancer which these commonly exhibit, when allowed to grow unmolested. These tumours arise about the head of the humerus more commonly than anywhere else, advance continuously, though with extreme slowness, into ponderous masses many pounds in weight, and ossify either by multiple

* The growth, however, is reported as an "ossifying sarcoma." There was no cartilage, and apparently no true bone-structure.

centres of ossification or by a process commencing on the surface and extending inwards. When the patient has reached the cancer age, they begin sooner or later to increase rapidly; they develop inflammatory symptoms, originate visceral or other metastases, ulcerate or slough, with horrible fœtor; undergo "liquefactive degeneration," the older portions breaking down into a soft pulp; and prove ultimately fatal. Microscopically the osteo-chondromata exhibit features according with their duration. At first they consist of normal-looking cartilage; later, partial ossification will have taken place. When the cancerous stage has been reached, we find parts of the tumour still presenting these benign characters; while others are occupied by masses of cells, with nuclei numerous, very large, and extremely diversified in shape and size. Cysts containing serum or blood, or filled with a glairy, gum-like liquid, often occur.*

The ossification of an osteo-chondroma, however, is but a secondary and subsidiary process, occurring always after a considerable period of slow growth. In the typical "osteoid sarcoma" the conversion of the spindle-celled matrix first into cartilage, then into heterogeneous bone, is a predominating feature from the first. It occurs both in the primary tumour and in its metastases, and the cases run a very acute course. Numerous gradations between these two extremes, however, can be cited.†

* Lecture xxvi. in the *Surgical Pathology* is a rich mine of reference to the details of these obscure and rather uncommon cases. Some there cited may be regarded as malignant *ab initio*, others, in conjunction with the myo-sarcomata (*q.v.*) exemplify that reversion into cancer which probably almost any benign form of tumour occasionally undergoes, but which is most palpably associated with such as are permitted the longest duration.

Resulting from the proliferation of cartilage-corpuscles, and being "aberrant reproductions" of that material, these quasi-malignant osteo-chondromata may depart from the typical sarcoma-structure. Their cell-elements do not in all parts of the tumour present that tendency to the spindle-shape elsewhere attributed to the malignant lesions of the connective-tissues.

† The details of the following exceptional cases are worthy of note. In the *Path. Trans.*, xxxvii., Dr. W. H. Battle records an "osteo-chondrosarcoma" in the breast of a woman, aged seventy-three. It consisted of spindle and round cells; the cartilage in parts developed into true bone, with well-marked Haversian canals.

In the *Path. Trans.*, xxxv., Mr. Arthur Durham reports two instances of true

From the lesions described must be differentiated the process of Calcareous Metamorphosis or Calcification. A gradual deposit of earthy salts (principally amorphous carbonate and phosphate of lime, with a slight admixture of other alkaline bases) may, in course of time, take place in almost any form of benign tumour. The most frequent species so affected are fibromata and chondromata. The walls of cysts may undergo this change; and it occasionally takes place in uterine myomata of long standing.

The condition is one which, in any degree, appears to require a period of many years for its production. It may be compared to a similar phenomenon in various normal tissues of the extremely old. It is but rarely seen in association with malignant lesions.

Occasionally, however, the spindle-celled basis of sarcomata, and, more rarely still, the parenchyma of a carcinoma, have been found infiltrated with lime-salts. These spurious "osteoid cancers" may present a considerable macroscopic resemblance to bone; but under the microscope no lacunæ, canaliculi, or Haversian canals can be detected. Dilute hydrochloric acid

ossification in tumours not connected with bone. One occurred in the breast of a woman, aged twenty-seven; an encapsuled tumour contained intra-cystic vegetations, cartilage, and within the latter a plate of bone tissue, with lacunæ and canaliculi. The second was that of a malignant ulcerated mass, found in an old cicatrix of the abdominal-wall. The patient was a man, *ætat.* seventy-three. Fibrous tissue, myeloid cells, cartilage, and bone were present. The burn which had originated the scar-tissue had taken place at *ætat.* twelve. There were no metastases. (*See "Blastoma,"* with remarks, at p. 347.)

A case of "chondro-sarcoma" in the female breast is reported by Mr. Bowlby in vol. xxxiii. of the *Path. Trans.* The patient was a woman, aged forty-two; the tumour had lasted one year. After excision it reappeared in six months, and proved fatal; the lymph-glands were not affected. The breast was found converted into a mass of cysts, with intra-cystic vegetations; in parts, fibro-cartilage had been developed from connective-tissue. Some of the latter had undergone a mucoid degeneration in the central portion, a cyst with cartilaginous walls being thus constituted. There were a few calcareous nodules, in which the remains of cartilage-cells could be traced. A similar case, by Sir Astley Cooper, is referred to, with a duration of fourteen years.

Mr. R. W. Parker (*Path. Trans.* xxxi.) records a typical instance of osteoid sarcoma, in a child aged twenty months; it followed a fall. The new bone was produced by the ossification of cartilage. The left femur was the primary site: metastases were found in the *right femur, lungs, bronchial* and both inguinal sets of lymph-glands.

dissolves out the saline deposit, with effervescence; leaving behind the cellular matrix of one or other of the above cancerous growths, generally the former. When metastases have taken place, a microscopic examination will usually reveal the spindle-cell elements of sarcoma, without admixture of lime-salts; but occasionally these also are calcified.

These calcifying sarcomata are often, but not always, connected with bone. The amount of calcareous material varies from a few scattered granules or spicules to complete conversion of the entire tumour into a stony mass; cases of the latter exhibit one or other of two contrasted conditions. The chalky material is either spongy and friable, readily crumbling; or else singularly hard and compact, with a density resembling that of ivory.

Peculiar tumours, composed of a white densely-hard material, occasionally occur in the female breast. They are generally described as "calcified" or "ossified fibromata," and regarded as fibrous new-growths in which the original fibrous tissue has undergone calcification. In those I have met with, however, there was no evidence of such transformation; the entire mass consisting of the ivory-like material. Moreover, the affection may occur in youthful women, in whom a tumour has not long existed. There may be several small nodules of this substance, or the entire breast-parenchyma may have been thus transformed. The museum of the Cancer Hospital contains a specimen, believed to be unique, in which the whole breast is occupied by a densely-hard mass, in size exceeding that of a large orange. Its thin section reveals a fibrous-looking basis, without any of the characteristics of true bone.

The manner in which these mammary growths arise is not clear. They are, however, on the one hand not usually malignant; and, on the other, seem to need differentiation from simple tumours, in which the calcification was a gradual and subsidiary occurrence. They may be of embryonic origin.

The "calcifying sarcomata" of *bone* apparently differ from the true "osteoid sarcoma" only in degree. In the most typical instance of the latter acute disease, portions of the metastatic deposits present no approach to a bony structure; consisting only of spindle-cells, amid which occur crystal or

amorphous granules of calcareous salts with no regular arrangement; sometimes with, but often without, nodules of cartilage. Here the deposit of salts appears to constitute a stage preceding that of organisation into bone.

III. *Chloroma.*

Chloroma or green cancer is a very rare form of malignant disease, which occurs only in the bones of the skull or face, and always in young children. It is rapidly fatal, and very numerous metastatic deposits are found after death. The periosteum is the seat of origin. The disease was first described by Balfour in 1834.

The tumours are somewhat fibrous in consistence, of a greenish-yellow or greenish-grey colour, and sarcomatous structure (some are described as "round-celled"). In the cells green fat granules are numerous, and to these are due the peculiar coloration, which does not appear to be related to the blood or to bile-pigment. The green colouring matter can be dissolved out by maceration in chloroform as a dark-green oily liquid.*

Huber, *Archiv der Heilkunde*, 1878, xix. 129, had collected and analysed seven cases, all then recorded. By 1885 the list had increased to ten, and one, occurring in Norway, under the care of Dr. Gade, of Christiania, is described in the *British Medical Journal* of July 11 in that year:

The patient, a girl of five, was observed to suffer first with anæmic symptoms. Then a tumour made its appearance on the left cheek, and was accompanied by toothache, tinnitus aurium, otorrhœa, deafness, and continually increasing exophthalmos. Death ensued in nine weeks with pyrexia and great prostration. The characteristic greenish tumours were found in immense numbers on the dura mater, periosteum of skull and facial bones, internal ear, orbit, sternum, ribs, vertebral column, in the liver, kidneys, colon, lateral ligaments, and medulla of various bones. On the lower extremities were livid spots, the largest of which contained a butter-like substance.

* A green coloration is occasionally seen in primary carcinomata, and "adenomata" of the liver, as the result of modified bile-pigment. (See seven cases by Mr. F. T. Paul, in *Path. Trans.* xxxvi.) Some of the new-growths described presented the ordinary white appearance; others were yellow, and two of a "bright olive-green."

Of the causes which lead to this peculiar coloration, nothing is known.

IV. *Spindle-sarcoma containing Giant-cells*: Syn. *Myeloid Sarcoma*. (Plates XI. and IV.)

In addition to the structural elements of the spindle-sarcoma, this tumour-formation exhibits the peculiar feature of huge multi-nucleated corpuscles, scattered at irregular intervals through its substance. These somewhat resemble, in microscopic appearance, the myelo-plaxes of Robin, osteoblasts or osteoclasts, which abound wherever processes of bone-absorption or bone-formation are taking place. As the tumours in which these bodies occur generally, though not invariably, grow from a bone, the name, *μυελωδης*, marrow-like, was conferred upon them by Sir James Paget. But they are not known to bear any real relationship to the structures of marrow; nor does the resemblance in question seem to be more than superficial.

The giant-cells (*Riesen-zellen*) of sarcoma are minute masses of protoplasm, of varying shape and size, sometimes rounded, but more often with a ragged irregular outline. They contain multiple nuclear bodies, in number from two or three to sixty, which are very sharply stained by logwood, and thus contrast with the dull untinged opaque area amid which they are located. In the distribution of these latter no rule is obvious; they may be closely agglomerated in a small corner of the giant-cell, or may be scattered indiscriminately over its entire extent.

The multi-nucleated corpuscles are found in small loculi amid the semi-organised bands of embryonic spindle-cells which constitute the basis of the tumour. In microscopic sections there is often a small free space at one side, from contraction during the process of preparation. The number of the cell-bodies may vary in different parts of the growth, and individual tumours possessing them also show considerable diversity in the quantity found. When most plentiful the growth is extremely vascular, and its cut surface exhibits a dark-red hue; the texture also is fleshy-looking, bearing a resemblance to that of the heart. In most of the cases the giant-celled

element is insignificant in proportion to that of the spindle-cell structures.

Sarcomata containing giant-cells (not to be confounded with the large multi-nucleated cells often found in carcinoma), occur with a single exception in tumours growing from bone or periosteum. Mr. Butlin finds that the lower jaw, the lower extremity of the femur, and the upper of the tibia, are the parts most exposed to attack. The characteristic corpuscles are found in both sub-periosteal and "central" tumours. There is no definite rule of quantity; but in the belief of the same authority (*Sarcoma and Carcinoma*, p. 83), the giant-cells are on an average more numerous in the latter. Even the "central" tumours may be wholly free.*

In rare cases, spindle-sarcomata of the female breast have been found to contain myeloid corpuscles. The following is an instance from my own practice.

Betsy W., aged sixty-two, was admitted into the Cancer Hospital on November 22, 1886, with a tumour in the left breast, noticed nine weeks. This appeared a few days after lifting a heavy weight; also on account of much recent trouble. The whole of the mamma was occupied by a malignant new-growth, movable, hard. Several glands in the axilla were enlarged to the size of beans. The nipple was retracted.

On excision, the mass was composed of typical spindle-celled tissue containing numerous myeloid corpuscles. The enlarged glands, however, were found converted into small cysts filled with a black, grumous fluid, without any malignant cells discoverable by the microscope. The patient was discharged, apparently well, in January 1887, but readmitted in May, with a tumour as large as a small orange, under the left pectoralis muscle. It had been noticed three weeks, had all the appearance of an enlarged lymph-gland, and was so recorded in the notes. It was removed, and proved to be a deposit in the muscle-substance at the junction with the tendon; it was extremely vascular, and was breaking down. The scar was healthy. Further reappearance shortly ensued in the same region (probably also in the viscera), and death took place in August 1887.

* In the *Path. Trans.*, xix., 31, is a case reported by Dr. Wardell, and sometimes alluded to as "myeloid tumour of the brain." There is no record of a microscopic examination; and there was a growth from the right parietal bone.

In the *Med.-Chirurg. Trans.*, xlix., is another by Drs. Clifford Allbutt and Moxon, designated "myeloid disease of the lung." Reference to the recorded details shows that the point of origin could not be ascertained; and the histological peculiarities of the lung-deposit plainly indicate a primary growth from periosteum.

The real origin and significance of the giant-corpuses is a problem as yet unsolved. Sometimes they are associated with malignant tumours, of very slow progress, and long duration; as in many springing from the lower jaw. At others, the sarcoma is of very acute type, as in the case quoted above. Similar discrepancies are apparent in the course of typical spindle-sarcomata, wherein myeloids are wanting; so that their presence amid malignant spindle-celled tissue is not known to influence the course of the disease. In clinical career spindle-sarcomata with giant-cells do not appreciably differ from spindle-sarcomata without.*

V. *Alveolar Sarcoma.*

Under this term have been described malignant growths of three distinct types of structure.

* The "giant-cells" of tubercle and the "myeloid" corpuscles of sarcoma are indistinguishable; both appear to be portions of necro-biotic tissue undergoing phagocytosis. The evidences for this view in respect of the latter are: (a) The dingy colour, in a logwood stained specimen, of many myeloid bodies. The tint resembles that of the *globe epidermique* under the same conditions. (b) The manner in which the outlines of the myeloid corpuscle blend with the surrounding tissue. (c) The mixture of spindle-celled nuclei with leucocytes, both appearing as nuclei. (d) The absence from some of any nuclear body, a fragment of evidently decayed tissue only remaining. (e) In others, certain of the nuclear bodies stain very faintly, while others are brightly tinged—an indication of progressive degeneration.

Marrow-infection.—A remarkable case of "myeloid sarcoma" of the lower jaw, associated with the phenomena of mollities ossium, by Mr. H. T. Butlin, is reported in vol. xxxi. of the *Path. Trans.* A man aged fifty, in June 1877, had two small painless tumours of the lower jaw, one of seven, the other of four years' duration. In the following September he fractured his left femur through very slight violence, then gradually sank and died. The primary jaw-tumours were red, fleshy, and firm; consisting of abundant myeloid corpuscles with spindle-celled tissue. Similar growths existed in the right sixth rib, and in the fibrous tissue close to the spine on left side of thorax. There were deposits of a red, firm substance, much of which displayed corresponding microscopic appearances, in the necks of both femora and right humerus, where cysts containing a clear fluid were also present. All the other bones examined were soft, with the Haversian canals widened out, and cancelli enlarged, and with the myeloid elements present here and there.

The author himself regards the case as one of mollities ossium unconnected with sarcomatous disease, and only casually associated with the latter. It seems to afford support to a suggestion hazarded by myself (*Brit. Med. Journal*, April 2, 1892), that many examples of mollities ossium are but instances of undetected cancer.

- (a) Endotheliomata (*q.v.*)
- (b) Large round or spheroidal cells, in no way differing from those of carcinoma, are found occupying the loculi of apparently normal connective-tissue. Some of the latter are occupied by a single cell; others contain several. No malignant spindle-cells, or embryonic structure of the connective-tissue series can be detected.
- (c) A stroma of fusiform cells encloses within its alveoli, either small collections of round or ovoid cells; or else an admixture of these with fluid, apparently the result of their liquefactive degeneration.

Of tumours ranking in the second (b) of these classes, the pigmented new-growths of the integument, which are often called melanotic sarcoma, furnish excellent examples. This is especially the case when a lymph-gland has been secondarily invaded; the normal lymphoid cells are seen to have been supplanted by the new cell-elements, which now occupy the meshes of the adenoid reticulum, Virchow has also described "alveolar sarcomata" derived from soft warts on the cutis which probably belonged to the same series. In Chapter X. reasons are adduced for referring cancerous growths of this description to the columnar cells of the Malpighian rete.

It remains to consider, as real products of the connective-tissues, the tumours of the third category, as described above. The round or ovoid cell-elements, filling the loculi of the stroma, appear to be free nuclei derived from broken-down spindle-cells. They are more or less degenerate, and may be wholly converted into a mucoid fluid. New growths of this character most commonly spring from the periosteum. In clinical course, they resemble the ordinary spindle-sarcoma; from which they can only be distinguished by the microscope.*

* With advantage, the vague term "alveolar sarcoma" might be abolished, and tumours so designated referred to other classes. Virchow describes these tumours as arising in *soft warts of the cutis*. Billroth, on the other hand, refers them to *muscle, skin, and bone*; and relies upon the intimate connection of the carcinomatous-looking cells with the fibrous stroma, as proving their connective-tissue source.

Dr. Gilbert Barling, in the *Path. Trans.*, xxxvi., records an "alveolar sarcoma" of five years' duration, in the triceps muscle of a girl, aged twenty.

Drs. Sheridan Delepine and G. R. Turner give full details of another in the *Path. Trans.*, xxxviii. The patient was a young man, also of twenty; the tumour originated in periosteum, and was attached to the twelfth left rib, the outer lip of the iliac crest, and the transverse processes of all the lumbar vertebræ. It fluctuated, and resembled a lumbar abscess. Death took place within a year. The lumbar glands and pancreas were completely infiltrated, and metastatic deposits were present in the lungs, diaphragm, great omentum, mesentery, and mesocolon. Microscopically, an almost homogeneous stroma with traces of longitudinal fibrillation, constituted round or elongated alveoli, containing small irregularly rounded cells attached to these walls, with probable fluid during life. In parts, these cells were spindle-shaped; and there, the alveoli were not well-marked. The development of these loculi in the diaphragm-deposits is traced to a proliferation of the corpuscles of the endomysium; the muscle-fibre being first compressed, then obliterated; while its former place became the lumen of the new alveolus.

CHAPTER V.

MYO-SARCOMA.—RHABDO-MYOMA.

I. *Myo-Sarcoma.*

Definition.—Cancer originating in the nuclei of non-striated muscle. (Plate X.)

Most instances of this disease hitherto reported have arisen in or about the uterus. They are few in number; but have probably been very often confounded with sarcomata of connective-tissue origin, and may eventually prove to be much more common than has hitherto been supposed. Most of these reported by Mr. Lawson Tait, under the designation of "soft œdematous myoma," apparently belong to the class. Pathologically they are important; as affording the most unimpeachable examples of a primarily benign tumour becoming subsequently cancerous. The following is a typical case reported by Dr. David Finlay (*Path. Trans.*, xxxiv., 1882-83, p. 177):

A woman, aged fifty-nine, had been the subject of a hard swelling in the lower part of the abdomen for fifteen years. It had given her no inconvenience till recently; then increasing rapidly in size. The catamenia had always been normal; had ceased ten years previously. There was a large, solid, hard, rounded tumour within the abdominal cavity in the middle line; from the upper part thereof, two smaller nodular growths proceeded. Being admitted into hospital, the patient died in eight days from acute peritonitis.

At the autopsy, with the usual evidences of recent peritonitis, a large globular tumour, of the size of a fetal head, was found attached to the fundus of the uterus, by a pedicle one inch wide. To this the omentum and intestines were firmly bound. On its summit were two large nodules; behind these the small intestine was adherent, and had become perforated by the new-growth. The upper part of the latter was soft and degenerating; presented a ragged cavity, containing

much débris. The lower half was comparatively firm, presenting the ordinary appearance of a uterine fibroid, whitish in colour, with here and there fleshy tracts of firm consistence. There was a distinct capsule.

Below, the fundus of the *bladder* had also become perforated; the disease appearing within the posterior wall as a small fungating mass. Behind the *uterus*, towards the right, was an ordinary fibroid, as large as a walnut. The *ovaries* were normal; there were some polypi in the *cervical canal*. At the base of the *right lung* was a mass as large as a crown-piece; on the wall of the *right ventricle* was a nodule, of the size of a pea; a similar deposit in the *right kidney*.

Microscopically, the tumour was found to present in various parts two distinct appearances. In some, small spindle-cells were alone found; these were in close juxtaposition with the non-striated muscle fibres; and had evidently been derived from the nuclei of the latter (*vide plates, loc. cit.*). In others, small round cells were present in large masses. In the secondary deposits, the same characters obtained; save that the round cells predominated. There were patches here and there (in the primary tumour) which showed the usual features of mucoid degeneration. In some parts there was a considerable development of new blood-vessels; their walls being closely surrounded by the cancerous cell-formation.

The origin of the malignant phenomena in this instance from an originally Benign Myoma of the ordinary type, is proved by the fifteen years' duration of the precedent tumour; by the absence of degenerative changes from the pedicle; and by the almost normal myomatous structure of the lower half. Some confirmation is afforded by the concurrent presence of a simple myoma.

In the *Path. Trans.*, vol. viii. p. 287, is a case of Mr. Hutchinson's, reported on by Drs. Bristowe and Priestley. Here the malignancy was primary.

Miss J., aged thirty-nine, was seen in April 1855. She had a tumour, of nine months' duration, growing in the posterior wall of the uterus, to all appearance a myoma. She was, however, blanched by repeated hæmorrhages; and there was an offensive discharge; no pain, but sensation of weight and dragging. The os and cervix were normal, and the health had previously been good. Eventually the mass protruded as a polypoid growth from the cervix, and was partially removed in July by Mr. Hutchinson. Its texture was homogeneous; "it very readily tore up into fibrils, all of which had a parallel arrangement, resembling decolorised solid fibrine from an aneurism." In December the growth reappeared, and was again subjected to operation. In March 1856 the tumour protruded from the vulva, and a ligature was applied to its base. Death took place in the following May.

The pathological report describes the neoplasm as too soft and lobulated for an ordinary fibroid; as flabby rather than pulpy. It consisted of two distinct elements; a tough, greyish, glistening fibroid structure; and secondly, a soft, opaque cream-coloured matter, elastic, closely grained, perfectly homogeneous in appearance. The former was identical with the normal muscle-fibre; the latter consisted of round or ovoid nuclear bodies, $\frac{1}{2000}$ th to $\frac{1}{4000}$ th of an inch in diameter, with fusiform cells. There were isolated nodules of the second element in the walls of the uterus; but no deposit in the other viscera. The cause of the disease is not stated.

The following case, by Mr. Callender, is published in the *Path. Trans.*, ix. 327. It is of special interest as recording the mode of causation; a point seldom attended to in the reports I have examined:

The patient was twenty-two years of age and unmarried. She enjoyed good health until a blow during the menstrual period in July 1852. This was followed by frequent floodings; in September, she complained of pain in loins and hypogastrium, with bearing-down sensations not relieved by recumbency. There was an offensive discharge; the os was patulous, and a polypus, of the size of a pigeon's egg, protruded. Nine operations were performed, each of which was succeeded by rapid reproduction, with profuse hæmorrhage. In May 1856, an abdominal tumour rose to above the umbilicus, where the circumference was $32\frac{1}{2}$ inches; at the same time, a lobulated soft growth occupied the vagina. Among the symptoms were impaired respiration; a swelling on the right side of the cervical vertebrae, and left hemiplegia. Death took place in January 1858.

At the autopsy, a large oval tumour was found to extend from the left iliac fossa to the level of the left kidney; it was surrounded by a thin transparent membrane, which, dipping into its substance, divided it into irregular lobes. Its base was $2\frac{1}{2}$ inches in thickness; it sprang from the posterior wall of the uterus, and thence expanded into an oval mass $5\frac{1}{2}$ inches in diameter. It consisted of "oat-shaped cells, mingled with others of a flattened fibroid form; each had a single nucleus, with several clearly defined nucleoli." Septa of imperfect fibrous material extended through all parts of the growth.

The *lumbar glands* were infiltrated (? by contiguity), and much enlarged. There were abundant nodules, chiefly composed of oat-shaped cells, in the *pulmonary tissue*; three in the *parietal pericardium*. There was a similar deposit, which compressed the spinal cord, in the *sixth cervical vertebra*.

Schroeder, in Ziemssen's *Encyclopædia*, vol. x. p. 308, figures a case of "spindle-celled sarcoma," in a woman aged fifty-four. It depended by a broad base from the uterine fundus; was

ligatured, and does not seem to have recurred. It consisted of "almost pure fibrous (? fibroid) tissue, with a few scattered masses of cells."

In May 1890, Mr. Alban Doran showed at the Pathological Society, a tumour, removed from a woman aged thirty-one, which had been growing four years. It sprang from the fundus uteri; "was mostly made up of well-formed, plain muscle-cells; but also included large collections of relatively short spindle-cells, with broad, oval nuclei."

Another case, regarded as instance of "an ordinary fibroid tumour undergoing malignant degeneration," is reported in the *Cincinnati Obstetric Gazette*, for September 1890, by Dr. T. H. Byford.

A case of "soft œdematous myoma" removed by Mr. Lawson Tait, and of which microscopic sections were examined by myself in December 1891, presented phenomena almost identical with those depicted by Dr. David Finlay (*loc. cit.*). Some regions consisted of a small spindle-celled growth, close to bands of normal muscle fibre; others wholly of small round or oval corpuscles with relatively huge nuclei and of lymphoid appearance infiltrating the meshes of a loose connective tissue stroma. Transition-forms could be traced from the normal spindle nuclei of the muscle, first into the small spindle-cells, then into the small "lymphoid" round or oval cells of the new growth. There were many large blood-vessels, as in Dr. Finlay's case. The whole parenchyma had evidently been soaked in fluid exudation; which had to a great extent broken down the cells and had rendered them insusceptible of the logwood stain. The disease quickly recurred after excision.*

The existence of this important cancer-variety had not escaped the vigilance of Sir James Paget, although, when he wrote, it was confounded with spindle-celled sarcomata, under the common designation of "recurrent fibroid." Thus in the *Surgical Pathology*: "Some cases have occurred in the practice of

* Another case of the "soft œdematous myoma" removed by Mr. Lawson Tait, which he kindly afforded me an opportunity of examining at the same time, proved to be one of the ordinary benign myoma. Thus, under the title in question have been confounded two distinct species of tumour—viz., the cancerous myo-sarcoma, and a simple myoma, of loose texture, which has become the seat of serous exudation.

Sir J. Y. Simpson, in which fibrous tumours, growing from the cervix uteri into the vagina, and removed by operation, have recurred after an interval of some time. In one case, the tumour recurred three times. In the second tumour, the fibro-muscular structure was recognised more especially in and near the pedicle of attachment." The microscope revealed spindle-shaped cells mingled with round or oval corpuscles.

Schroöder, in Ziemssen's *Encyclopædia*, describes myo-sarcoma, as "sarcoma of the parenchyma of the uterus"; and states that it not unfrequently proceeds from degeneration of the fibro-myoma. It does not occur so exclusively in advanced life as carcinoma of the uterus; and here also displays its relationship to myomata. Of 18 cases cited (*loc. cit.*) 1 was "young"; 2 were 20-29 years of age; 5, 30-39; 8, 40-49; 1, 50-59; 1 over 60. Among 14 patients, 3 were multiparous, 3 had borne 1 child, 3 had each 3 children; 1, 2 children; 1, 5 children, 1, 6 children; and 2 were styled "multiparæ."

Associated with the uterus, myo-sarcomata may be primarily malignant; or the cancerous symptoms may follow an ordinary myoma, quiescent many years. The growths form soft, somewhat lobulated, roundish tumours, which increase in both an upward and downward direction; and may eventually protrude as livid masses from the umbilicus or vulva. The fundus and the posterior wall are favourite sites. Commonly they are pedunculated; and attached to the uterine muscle-substance by a particularly broad and thick stalk. The disease always commences as a single tumour; and subsequently causes metastatic deposits in the lymph-glands and viscera. When removed in the solitary stage, the growth is often covered by a thick layer of healthy, though hypertrophied, uterine tissue.

When cut into, these tumours exude an enormous quantity of serum; thus undergoing reduction to a quarter or less, of their original bulk. The cut surface has a gelatinous appearance, before evacuation of the serum. Subsequently the consistence of the mass varies in different parts. Some may be tough whitish or yellowish-white, fibrous, almost exactly resembling the tissue of a myoma; while other parts may be soft, greyish homogeneous, easily broken down. The latter, after immersion in alcohol, look very like the decolorised fibrine of an aneurism.

These softening areas occur most towards the centre ; they are marked in proportion to the duration of the disease. Clots and local extravasations are not infrequent. Unless there are metastases, the tumour is solitary ; thus contrasting with myomata, which are almost invariably multiple. The typical microscopic appearances are those recorded in Dr. Finlay's case.

Of the cancerous symptoms, the earliest and most striking are profuse and oft-repeated floodings, which are uncontrollable by medicines, and unless checked by surgical measures, prove quickly fatal. An offensive vaginal discharge is also an early sign. Sensations of weight and "bearing down" are much more pronounced than with the simple myoma, and there is, from the first, conspicuous impairment of the physical powers, indicating the presence of grave disease. No pain is complained of in the early stages ; later, there is very severe, continuous aching in the tumour itself, in the lumbar region and thighs. The symptoms progressively increase in severity, and unless checked by art the malady soon ends life.

In the cases recorded, little attention has been paid to the mode of causation. Sometimes we find the disease ascribed to a blow or fall, but as a rule the conditions preceding the development of cancer-symptoms would seem to have escaped inquiry.*

* Although the typical examples of myo-sarcoma have hitherto been referred almost exclusively to the uterus, there can be little doubt that the malignant disease occasionally attacks other organs, and may be found wherever the correlated benign overgrowth of non-striated muscle is known to occur. Thus, Dr. Hilton Fagge records a case of myoma in the oesophagus (*Path. Trans.*, xxvi.); and Dr. Percy Kidd, one of "fibro-myoma of the stomach" (*Ibid.*, xxxv.).

A case of myo-sarcoma in the urinary bladder is recorded by Mr. F. S. Eve (*Path. Trans.*, xxxvi.). No history is given. A tumour occupied the whole thickness of the bladder wall ; it was very prominent above and to the outer side of the right ureter ; there was no change on the inner surface, except a scarcely noticeable erosion. It consisted of three cell-elements : (a) Spindle-shaped nuclei, some very elongated and fibre-like, apparently on their way towards conversion into non-striated muscle ; (b) Large cells, with huge spheroidal nucleus, and often multi-nucleated ; (c) Numerous nuclei apparently young elements of (b). "The muscular bundles were widely separated by connective tissue, and individual fibres were frayed out by an infiltration of young cell-elements."

From the broad ligament, Mr. Lawson Tait has enucleated four large tumours which "could not be distinguished in appearance from the soft edematous myoma" (*Abd. Surgery*).

II. *Rhabdo-Myoma.*

Examples of this rare disease have been reported under the designation of "myo-sarcoma;" but require differentiation from the preceding. They rank properly with the Blastomata (*q.v.*)

The subjects are always infants, and death takes place before they arrive at the age of two years; usually within eighteen months. A tumour is found in the early months of life occupying the region of the kidneys; commonly the growths are bilateral. They increase rapidly, and speedy death ensues.

At the autopsy the tumours are seen to be closely connected with the kidney, yet to be distinct from the true renal parenchyma. Occasionally, however, they have apparently obliterated the latter by pressure; in Dr. Dawson Williams's case (*Path. Trans.* xxxii.) no vestige of kidney-substance could be detected, the growth being unilateral. Microscopically, they consist of an admixture of bundles of *striated muscle-fibre* crossing each other without definite arrangement; with true sarcoma-tissue of round and spindle cells. Cysts are always present, sometimes without epithelial lining, sometimes regularly coated by columnar epithelium; hence, probably of two sources.

These tumours are apparently congenital. They have been referred to the Wolffian body, and similar formations have been described in the testicle. Cohnheim suggests that "by a faulty segmentation of the proto-vertebræ, some of the germinal muscle-cells may be mixed from the commencement with the cells constituting the rudiments of the kidneys, and that these germinal muscle-cells afterwards develop into a pathological new growth."

Secondary metastases have been reported in two cases; the *liver* and the *diaphragm* being the seats. These always contained sarcoma-tissue, in one instance striated muscle-fibre.*

* Two cases by Mr. F. S. Eve and Dr. Dawson Williams in the *Path. Trans.*, xxxiii. 1880-81, include references to five others then recorded. A case of "pigmented rhabdo-myoma" in a horse is described by Kolessnikow in *Virchow's Archiv*, 68. See also p. 348 *et seq.*

CHAPTER VI.

LYMPHO-CARCINOMA : *Syn.* LYMPHO-SARCOMA.

Definition.—The primary cancer of lymph-glands, and of the lymphoid or “adenoid” tissues in general. (Plate VI.)

This common form of malignant growth was one of several kinds grouped together by older writers under the common title of “encephaloid” or “medullary” cancer, and is one respecting which much vagueness of diction still prevails. Many tumours of the class are recorded as “sarcomata,” particularly of the “small round-celled” variety. And the malady is often confounded with “lymphadenoma” or Hodgkin’s disease.

The modern term “lympho-sarcoma,” although devoid of obscurity, would seem to indicate analogy to malignant neoplasms of the connective-tissue series. I have therefore ventured here to substitute “lympho-carcinoma” as more in accordance with the natural affinities of the cancer; although “absorbent,” in contra-distinction from “secreting,” cell-elements are the subjects of attack by the malignant process.*

Lympho-carcinoma is then the cancerous proliferation of lymphoid cell-elements, which multiply at the cost of all the tissues around, and which rapidly diffuse themselves, in the first instance, to adjoining lymph-glands, subsequently to the

* It follows from the definition that lympho-carcinoma cannot arise primarily except where “adenoid” tissue pre-exists. According to Klein’s Handbook, *diffuse adenoid tissue* occurs in the mucous membrane of the trachea, false vocal cords, and laryngeal ventricle, posterior part of the epiglottis, soft palate, tonsils, root of tongue, pharynx, small and large intestine, vagina and nasal cavity. *Cords, cylinders, or patches* are found in the spleen, in the omentum and pleura. *Lymph-follicles, i.e.,* defined masses of lymphoid cells and stroma in the tonsils, root of tongue, upper part of

internal viscera, and to distant parts of the body. It is only the cells which take part in the process, and these erode the connective-tissue reticulum amid which they are situated, in a manner only to be described as "promiscuous," without any settled or characteristic mode of distribution.

The disease is invariably acute. As seen in the external lymph-glands, the site in which it most commonly comes under the surgeon's notice, it first appears as a roundish enlargement of a single gland. This is slightly tender on pressure, but is painless, and in no way differs from the enlargement which lymph-glands in young people are apt to undergo, under the influence of any septic absorption, trivial or otherwise, in the vicinity. It, however, proves rebellious to all therapeutic treatment, and quickly increases in bulk. The neighbouring glands also enlarge in the order of their proximity, and become adherent to that first attacked, so that a bossy, nodulated tumour results. The apparent consistence of the latter varies with its locality; when under rigid fascia it feels to the touch extremely hard; when devoid of any such envelope, is soft and somewhat elastic. In any case, degenerative softening promptly ensues, giving rise to one or more "boggy," fluctuating, areas. The skin-covering adheres, becomes livid; a quasi-abscess points, and finally discharges its semi-purulent contents.

So far the phenomena are very similar to what takes place when the glands are secondarily implicated by cancerous disease, as, for example, by tongue-epithelioma. Instead, however, of a sinus resulting, as often happens in the latter disease, a considerable portion of the integument disappears, and an ever-widening ulcer follows. There is also evidence of deposit in more distant parts or organs.

The ulcer of lympho-carcinoma has a margin composed of tense, livid skin, seeming tightly stretched over the underlying pharynx, stomach, both intestines; large and small bronchi, nasal mucous membrane; Malpighian corpuscles of spleen.

The lymph-glands are compound lymph-follicles; so also is the thymus. According to Arthur Johnstone, the endometrium should also be classed among the adenoid tissues (*Gynecol. Trans.*, 1886, 1887); cancerous growths here, however, do not present the appearances of lympho-carcinoma. The marrow of bone presents considerable analogy to the lymphoid-tissues, both in structure and function; but its morbid products are at present extremely obscure.

parenchyma, but not hard and warty-looking as in epithelioma, and not homogeneously blended with the underlying parts as in scirrhus carcinoma. The sore is often more or less circular in shape. Its base is composed of a reddish tissue, bearing a worm-eaten, rather than a granular, aspect, and protruding slightly. It is rare to see any very prominent fungous growth; on the other hand, no attempt at cicatrisation takes place. Slight hæmorrhage ensues when the ulcer is touched, but this is not usually profuse until large blood-vessels become implicated. Large portions may eventually slough, leaving a deep excavation. The discharge is always sanious and fetid. From the first inception of the disease, considerable hyperæmia of the tumour and its vicinity is present.

The infection spreads from gland to gland with great rapidity; at the autopsy very numerous metastatic deposits in these and in the viscera, particularly in the lungs and the liver, are an invariable feature. A phenomenon more often associated in my own experience with lympho-carcinoma, than with any other species of cancer, is a very wide and general diffusion of secondary nodules in the sub-cutaneous tissue. The skin of the trunk and extremities becomes studded with isolated masses, varying in size from a pin's head to that of a large orange, and in number, from a dozen to some hundreds. They are soft and elastic, not lobulated or pedunculated.

If a lympho-carcinomatous growth be excised in an early stage, while still restricted to the gland in which it has arisen, it will of course be found within the capsule of the latter; but such an event must be extremely rare in surgical annals. By the time such tumours fall under the surgeon's care, they consist of a large number of glands, blended with skin and fascia into an inextricable mass. Prior to degeneration, the cut surface is white or pinkish-white, soft, and homogeneous.

Under low powers of the microscope we behold an enormous multitude of small cells, "lymphoid" in appearance, round or oval, blended with a scanty remnant of the adenoid reticulum. At first sight, beyond their numbers, and the manner in which they have evidently broken down the normal stroma, there is

nothing to stamp these bodies as malignant. When, however, higher powers are applied they betray the usual characteristics of the cancerous process.

The majority of these roundish bodies are seen to be nothing else than nuclei stained vividly with logwood. Others retain a scanty fringe of non-stainable protoplasm, attached usually to one side, the relatively enormous nucleus thus being excentric. All are actively proliferating and dividing; where a low microscopic power shows a single nucleus, a medium one displays several, and a high power many more; and even when still solitary the nucleus is found to betray marked indications of incipient cleavage. Each nucleus usually contains one or more highly refracting vesicles (nucleoli). In a tumour of any duration abundant oil-globules and masses of cell-debris occur as in all actively growing cancer-parenchyma.

Although when highly magnified, some diversity in shape and size is apparent in the cell-elements of a lympho-carcinoma, yet it is by no means so marked as in most other species of cancer. The prevailing type of cell (or rather, of nucleus) is round or oval.

When the malignant process attacks external lymph-glands, those in the *neck* are the most frequent site; next to this the glands in the *groins* and *axilla*. There is generally a history of *traumatism*: sometimes in the form of a blow or fall, sometimes in the indirect guise of a sprain, or undue muscular effort (a frequent cause also of non-malignant lymph-gland enlargement). The patients are aged, or advanced in middle life; often careworn, seemingly broken down, and prematurely old. They frequently speak of antecedent pecuniary or other troubles.*

When, however, the glands within the cavities of the trunk become thus diseased, the causes, symptoms, and whole course of the malady become involved in much greater obscurity. In those I have encountered, one of two immediate antecedents was always discernible: (*a*) Mechanical injury; (*b*) A prolonged mental distress and anxiety. Some of the examples reported,

* See Table of cases at p. 337.

particularly when the thorax was in question, occurred in childhood or early youth. The mediastinal glands are a rather frequent seat of this disease; the lungs being secondarily implicated. When those of the abdominal cavity are primarily affected, huge masses of what was formerly termed "encephaloid" cancer arise, often of extremely soft consistence. Many such are vaguely set down as "sarcomata."

Cyst-formation may take place in primary lesions of the lymph-glands; but in my own experience at least is very rarely met with. In addition to the above organs, the tonsils and the naso-pharyngeal cavity are frequent sites of lympho-carcinoma. Of the mediastinal cancers of the young, the thymus is commonly the starting-point. Elsewhere cases of the growth are prone to be recorded as "round-celled sarcomata of the small-celled variety."

Lymph-cancer, beginning in the glands of the lymphatic system, has been confounded with the disease known as "Hodgkin's," under the title of "lymphadenoma;" and not only has merely verbal obscurity thus arisen, but delineations and descriptions applying to the latter have been frequently made to refer to the former. Hodgkin's disease is a general and more or less simultaneous hypertrophy of the lymph-glands, and lymphoid tissues throughout the body. It depends upon causes at present ill-understood; but has, in none of its microscopic or clinical phenomena, any affinity to the cancers, being seemingly a general febrile blood-disease. It may be accompanied by splenic enlargement; and in rare cases by leukaemia, the leucocytes present in the blood being however very small and "lymphoid" in appearance. Attacks of pyrexia occur from time to time, and prove ultimately fatal. Ulcerative phenomena are wholly wanting. The malady is apt to occur in pregnancy; and to follow exposure to cold and wet. When an enlarged gland is microscoped, the adenoid reticulum is found greatly hypertrophied, and fibrous-looking; with a corresponding increase in the number of the endothelial cell-plates. *Per contra*, there is a great diminution of the lymphoid cells, which have given place to fibrous tissue. The organ in fact has undergone a process of cirrhosis. This disease, to which the word "lymphadenoma," if still employed, should properly be

restricted, is one which originates no metastases; and affects the lymph-glands almost exclusively.*

Lympho-carcinoma, on the other hand, is a product of the lymphoid cells, which are enormously increased in number and which betray the characteristic features of malignancy above described. The reticulum is scanty or entirely absent. Like all cancers it arises in a single gland or tissue area, whence the infection extends to other parts in the usual manner. It has no association with pregnancy or with prolonged exposure. When the primary growth is near a mucous or cutaneous surface it usually ulcerates.† There are eventual metastases in visceral organs not appertaining to the lymphatic system.

Dr. Greenfield reports a case of wide dissemination by the sub-cutaneous tissue in the *Path. Trans.*, xxvii.; Drs. Gairdner and Coats another in vol. xxx. of the same. In the latter, some of the skin-tumours disappeared under observation; the patient was a man, aged fifty-two. In my *Palliative Treatment of Incurable Cancer*, p. 31, I have noted a similar occurrence in association with mammary scirrhus.

Lympho-carcinoma attacking the thymus may interfere with the cytogenic function of that gland; the blood becoming filled with abnormal and unhealthy leucocytes, which lead to miliary thromboses and extravasations. Hence petechiæ, hæmorrhages, and severe purpuric symptoms, proving quickly fatal. (See cases by Dr. Hilton Fagge, *Practice of Medicine*, vol. i.; Dr. E. N. Nason, *Brit. Med. Journal*, Dec. 26, 1891.)

* In Fagge and Pye-Smith's *Practice of Medicine*, ii., art. "Hodgkin's Disease," reference is made to a case diagnosed as one of Hodgkin's Disease; but in which the lymph-gland enlargement proved post-mortem to be secondary to a malignant tumour of the broad ligament.

† An examination of the blood will not aid diagnosis. Leukæmia is rare in Hodgkin's disease. The blood of persons dying with any form of cancer will show a marked paucity of red, with relative preponderance of white, corpuscles.

CHAPTER VII.

CYLINDROMA.

Definition.—The cancer of *unbranched* tubular gland-follicles—viz., Lieberkühn's crypts, the peptic or pyloric glands.

Site.—The stomach and intestines. Most frequently found in the rectum.*

The term "cylindroma" is not wholly free from ambiguity, having been also applied by Billroth to his "plexiform sarcoma" (p. 171). It is, however, a convenient designation for the variety to which it is here restricted, and which occurs only in parts occupied by unbranched follicles, lined by epithelial cells of "columnar" or "cylindrical" shape.†

Cylindromata are essentially cancerous reproductions of tubular gland structures. As the epithelial lining of these

* Carcinoma of the uterine cervix is derived from the tubular gland-structures of the canal; and approximates in structural type to the cylindromata.

† Branched or convoluted tubes, such as the salivary and sudoriparous, approximate to the acinar type of structure; and do not generate cylindroma.

Cylindromata are occasionally referred to as "columnar epitheliomata." The phrase is misleading, as implying that the cancerous growth is the product of columnar (cylindrical) epithelium. Columnar epithelial cells are present in very numerous regions of the body. Among these may be pointed out the Malpighian layer of the skin, the corresponding structure of the cornea, and of the buccal mucous membrane; the ducts of the mammary, of sudoriparous, mucous, and salivary glands, the outer root sheath of the hairs; the ceruminous glands, and membranous labyrinth; the nasal cavities, with the Eustachian tube, and upper part of the pharynx; the larynx, trachea, and bronchi, the alveoli and duct of the pancreas; the vasa recta and epididymis, the vas deferens, vesiculæ seminales and ejaculatory ducts; the male urethra, Cooper's glands, prostatic alveoli and ducts; the membrana granulosa of the largest Graafian follicles; the Fallopian tube, endometrium, glands of uterus and cervical canal; the acini of the thyroid and supra-renal bodies, with the lower lobe of the hypophysis cerebri, &c. &c. Yet the typical

latter is but slightly modified pavement-epithelium, so the clinical characteristics of the new growth closely correspond to those of epithelioma. It is a localised cancer development, more often attended by infiltration and excavation than by fungous protuberance; generally chronic in course, with comparatively slight tendency to produce general blood infection, and multiple metastases. From the induration and contraction present, it formerly passed as "scirrhus" cancer. In most cases it commences like epithelioma, as a shallow ulcer on the mucous membrane, with a hard margin of infiltrated mucosa and submucosa, and with a vascular base, bleeding when touched. The adjoining lymph-glands are sooner or later infected, but as the disease occurs on a free surface, deposit in these organs may be long delayed. Metastases in the viscera

cylindroma is limited to the narrow range above stated. It is thus evident that columnar epithelial cells, *per se*, do not generate the form of cancer in question.

The shape assumed by epithelial cells is not a fixed property, and does not appear to influence the malignant product thereof. It varies with the physical environment, is modified by slight alterations in the latter, and even by alterations in the condition of the same organ. Thus the transitional epithelium of the bladder undergoes considerable changes in shape, according to the degree of distension; a similar phenomenon is exhibited by that of the *smaller bronchi*.

Extruded uterine polypi are found coated with squamous epithelium, in place of the normal columnar; and Roeckel has described a similar alteration in the mucous covering of a pile. Mr. S. G. Shattock (*Path. Trans.*, xiv. 209), remarks: "Many instances of epithelial mutation will suggest themselves. The epithelium of the bronchial tubes is columnar-ciliated, that of the air-cells flat, though they have a common origin. The œsophagus is at one time like the trachea, lined with columnar-ciliated epithelium, subsequently with stratified, though its glands retain the columnar." Drs. Haycraft and Carlier (*Quarterly Journal of Microscopical Science*, February 1890), have demonstrated that in the kitten the trachea is lined by columnar epithelium. In the adult cat the trachealis muscle causes an overriding of the extremities of the tracheal cartilages. This causes the ends to project into the trachea, and form a longitudinal ridge, which is separated by a deep groove from the part of the wall formed by the overriding cartilages. Whenever the trachealis contracts or relaxes, the epithelium in this groove is subjected to friction, and becomes gradually transformed from columnar-ciliated into stratified squamous epithelium.

See also Bland Sutton, *Dermoids*, pp. 29, 30. "These cases are of great value, for they decide the unstable nature of opinions on the genesis of cysts, founded on the character of the epithelial lining. Indeed, epithelium is very variable; especially when subject to pressure."

are met with, but are not usually numerous. The liver is particularly exposed to infection by rectal cylindroma, from the junction of the superior hæmorrhoidal veins with the inferior mesenteric. Marrow infection is exceptional; several cases have been recorded in which secondary tumours were found in distant bones, notably the femur or humerus.* These may have been due to direct infiltration of the sacrum.

The malignant sore gives rise to an acrid, fetid discharge similar to that of an epithelial ulcer. When near the anus this may be continuous and involuntary; higher up it is masked by chronic diarrhœa, or in the stomach by vomiting. Occasionally an *acute* form of disease is found as vascular, pedunculated bossy masses, showing no tendency to contraction. In the much more common *chronic*, the latter is a marked feature. The infiltration progresses in every direction; when the bowel is affected, its diameter becomes greatly diminished. Sometimes there is an annular constriction; and eventually several inches of the intestine may be converted into a rigid tube. Outwardly, the sub-peritoneal lymphatics and lacteals convey particles to various parts of that membrane; sub-acute peritonitis ensues, with adhesions or liquid effusion. The seat of disease is found blended with other parts of the bowel, or viscera, in a tangled, puckered, brawny mass, and considerable displacement may be caused by adhesions which have undergone contraction. The diseased tissue is brawny or gristly. It exhibits more or less mucoid metamorphosis, always on a microscopic, sometimes on a macroscopic, scale.

Secondary deposits in the viscera form white, firm nodules or masses. Those found on the surface of the liver are rounded and flattened, often with umbilication from central degeneration of the parenchyma.

Under the microscope we find the indurated tissues pervaded everywhere by tubes or follicles of varying shapes and dimensions lined by columnar epithelium. The earliest stage in the formation of the new growth is a small "pocket" of epithelioid cells, surrounded by connective tissue; it has no lumen. In the next we see a small round tube, with roundish central lumen, and columnar epithelium lining its walls. At a still more

* Vide *Path. Trans.*, 1892.

advanced period of growth, the tubes are found to have greatly enlarged at the expense of the tissue around; and at the same time to have become very irregular in shape. Many still retain on their walls a uniform coat of cylindrical epithelium; but inosculating processes of the same branch in various directions across the space from wall to wall. Many others have coalesced to form huge irregular cavities, containing large collections of new cells; and with few or no remains of epithelial lining. These new cells are for the most part small, oval, or roundish (not cylindrical); and are promiscuously heaped up in the cavity (no longer a tube); which, in a microscopic section, they do not completely fill. At various points in the parenchymatous mass, roundish areas of degeneration are seen; where the cell-nuclei are but very faintly stained by logwood. Sometimes around those colourless regions we see small cubical cells arranged in a circle; the original follicular mode of growth being thus slightly simulated.*

The most advanced stage of all in the progress of a cylindroma, consists in a promiscuous infiltration of the tissues by the small, roundish cells aforesaid. These—nuclei, rather than cells—are lymphoid in appearance and show no indication whatever of their origin from columnar epithelium. Except in the more recently infected parts, no trace of follicles is to be found. If only the former regions be examined error may occur.

The new cells still partially retain the secreting functions of their glandular progenitors. Thus, lying free within the lumen of many of the tubes, in a logwood-stained section, is to be seen a plug of colourless homogeneous substance; while others are empty, or show only a scanty remnant of the same, which has been detached in the process of preparation. This feature is invariable in the more recent stages. When the secretion is

* The microscopic appearance, however, of the large cell groups does not notably differ from that presented by such cell collections in carcinoma, where similar areas of degeneration occur, dotted about the parenchyma. In epithelioma, such cloudy regions are the first stage in the formation of the *globes epidermiques*.

The process of preparation for the microscope involves some diminution in the size of these masses; which originally completely occupied the now vacant space.

particularly abundant, the disease will probably be classed as "Colloid." Individual cells present the usual characteristics of cancer; the surrounding parts are hyperæmic.

In its mode of causation, as in naked-eye appearances and clinical course, cylindroma coincides with epithelioma. When in accessible regions, it is found similarly to follow continuous friction and to be predisposed to by chronic congestive conditions, or by any circumstance involving local mal-nutrition. When the lesion attacks parts such as the stomach, remote from observation, the mode of production can only be inferred by analogy. The only distinction between the two closely related species of cancer in question is afforded by the microscope.

Diffusion by the subcutaneous tissue, even in a slight degree, is naturally a rare event in cylindroma. Dr. David Finlay, however, records a case of cylindroma of the stomach, in which the trunk and limbs became profusely studded with polypoid excrescences, first noticed about the umbilicus. (*Path. Trans.*, xxxiv.)

Auto-Inoculation.—For instance see *Path. Trans.*, xvii. (Dr. Cayley). Disease commencing in the rectum in a woman aged thirty-four, perforated the posterior vaginal wall: and was propagated by contact to the anterior.

Calcification.—A case of "ossifying cancer of the rectum" is recorded by Mr. Wagstaffe in the *Path. Trans.*, xx. The patient was a woman, aged fifty-four when first seen; the history pointed to a *duration of twenty years*. The rectum was found converted into a bony tube; no cartilage was present, but the fibrous matrix was replete with bone-spicules, in which "numerous branching lacunæ had replaced the ordinary nuclei of the cells." (Possibly absorption of these nuclei simulated bone-lacunæ?)

The "*Tubular Epithelioma*" of Cornil and Ranvier bears no analogy to cylindroma. Part of the tumour exhibits under the microscope the characters of squamous epithelioma; this is probably the essential element. The remainder suggests a section through mucous gland-tissue. There is no production of columnar epithelium. A case affecting the upper jaw is reported by M. Bilton Pollard in vol. xxxvi. of the *Path. Trans.*; with another doubtful example by Mr. A. E. Barker. (See under *Blastoma*, p. 359.)

Cylindroma Carcinomatodes.—This epithet has been applied to a form of cancer, of which Ziegler, in 1883, had met with but one example—in the lachrymal gland; and which is therefore stated to be very rare. A plate is given in Ziegler's *General Pathological Anatomy*, i. "Large homogeneous spherules" are seen amid a cancer-parenchyma.

The microscopic phenomena there depicted, or at any rate such as very closely resemble these, are common in almost any large collection

of cancerous cells, encysted in a fibrous-tissue loculus; in logwood-tinged sections of lympho-carcinoma, in cylindroma, even in breast-scirrhus, for example, round colourless degeneration-areas are commonly dotted over such masses; some are bordered by a ring of brightly stained cells (which may be columnar in shape in the cylindroma).

No sufficient grounds for regarding "cylindroma carcinomatodes" as a distinct variety of cancer are so far proved. The condition figured by Ziegler is well seen in many cancerous growths of the thyroid body; the cells concerned continuing to secrete the glairy fluid proper to the healthy gland. The "spherules" are but drops of mucoid liquid, or of cells breaking down into such, amid the actively proliferating cell-elements of ordinary carcinoma.

The reproduction of "Lieberkühn's follicle-structure in an aberrant form," throughout the secondary metastases of gastric and intestinal cylindroma, is one of the most obvious and overwhelming arguments which controvert the microbe-theory of cancer-genesis. It is impossible to believe that an organism introduced into the body from without can possibly cause an elaborate tissue-arrangement to be thus copied in distant parts.

CHAPTER VIII.

RODENT ULCER.

Definition.—The cancer of short hair follicles. (Plates VIII. and VII.)

Like the preceding, rodent ulcer is a sub-variety of epithelioma. The disease consists in an infiltration of the tissues surrounding short hair follicles by the small roundish cells (modified epidermis) with which the latter are lined. Under the influence of the cancer process, these tend to arrange themselves somewhat after the pattern of their progenitors; and a microscopic examination of the part affected shows this pervaded by "aberrant reproductions" of the hair-follicle structure.

The follicles of long hairs terminate in the *stratum adiposum* of the sub-cutaneous tissue; those of the short, with which in rodent ulcer we are chiefly concerned, in the deeper portion of the *corium*. Each is practically an inversion of the Malpighian layer of the epidermis; without however the flattened scales of the *stratum granulosum*, which cease at its mouth. It consists of the *glassy membrane*, continuous with the basement membrane of the *corium*; enclosing very small epidermic cells, ranged in two layers, the *inner* and *outer* root-sheath. These are lined internally by a delicate *cuticle*, adjoining the cuticle of the hair; externally they are fringed by short columnar cells, corresponding to those of the Malpighian rete.

The mouth of each follicle is funnel-shaped; the small cells of its two layers here gradually emerging into the larger elements of the *stratum Malpighii*. Its closed extremity shows a slight expansion over the rounded and comparatively thick

hair-bulb; and in its centre is the fibrous-tissue *papilla* of the hair, enclosing a loop of capillary blood-vessels. The cells of the outer root-sheath in this expanded portion are seen to be diminished to a very scanty layer; those which remain are continuous with the polyhedral epithelium of the bulb. Cell-multiplication is especially active around the papilla: a layer of columnar cells adjoining the papilla taking the chief part in the growth of the hair. The cells of the bulbs are gradually pushed upwards into the shaft of the hair; where they become elongated and fusiform.

Of the two strata of epidermic cells which principally compose the hair follicle, the *inner* root-sheath is composed of horny cells (Henle's and Huxley's layers), some of which contain the scanty remnant of a nucleus, while others are wholly devoid of that structure. The cells of the *outer* root-sheath constitute the vital element of the follicle. They take the principal part in the foundation and growth of the hair. And when the old hair-shaft decays, its replacement by a new one is effected by an outgrowth of these into the vacant cavity; a new papilla being formed in opposition. The development of a rodent ulcer must therefore be referred almost exclusively to the elements of the *outer root-sheath*.

A normal hair follicle is invested by slightly condensed fibrous tissue, external to the limiting *glassy membrane*. In the rodent ulcer, the latter has been ruptured by the invading cells, which pass in every direction into the surrounding parts. They are ranged in columns of small-celled growth, which inosculate with one another, the intervening tissue being crowded with leucocytes. With the progress of the disease, both the cell-columns and the tissues which they penetrate are gradually carried away by the ulcerative process. At the edges of the sore, extension takes place after the same fashion, until the termination of the case. The diffuse and promiscuous infiltration of healthy parts by malignant cells which takes place in other varieties of malignant disease, when a very advanced stage has been reached, is not seen in cases of rodent ulcer.

The individual cells of the rodent ulcer are very tiny in comparison with those of epithelioma. They are generally ovoid or round in shape, betraying the usual indications of

malignancy. *Globes Epidermique*, small and significant in comparison with those of epithelioma, have been observed in some instances, but are not conspicuous features.*

The naked-eye appearances of a rodent ulcer differs little or not at all, from those of an epithelioma in its more chronic forms; and the two varieties can often only be differentiated by a microscopic examination. From the first, the disease is an open sore, with edges but slightly indurated, and with a red granular base. The discharge is scanty, sanious, and fetid; if the lesion is exposed to the air, it readily dries into a thin blackish scab. Partial or even entire cicatrisation may take place, to be followed, after a lapse of time, by a renewed outbreak. Such temporary healing, however, is exceptional; as a rule, the ulcer steadily, though very slowly, extends both in width and in depth. The natural configuration of the localities, however, usually renders the excavation shallow. When there is no immediately underlying bone, as in a case of my own which extended from the face into the neck, causing severe hæmorrhage and necessitating ligature of the carotid artery, a deep chasm may be formed.

The appearance and symptoms of the disease in its earliest stages, evince little of the phenomena which we mentally associate with "cancer." There are sensations of discomfort and of itching, but actual pain is only very slight. There may be at first little or no induration or elevation of the edges, the skin there being loose, freely movable and seemingly healthy. Eventually the lividity, hardness and adhesion to underlying tissue which we look for in a cancerous sore, become sufficiently pronounced. And there may be some wartiness in parts, as in epithelioma.

A *fungous protuberance* with rodent ulcer must be a phenomenon of extreme rarity. Sir James Paget however (*Surgical Pathology*) describes an instance of this in a case of disease upon the ear. So also the adjoining lymph-glands are not affected until a very remote period, and visceral metastases seem utterly unknown.

* An elaborate account of the inception of a rodent ulcer by bud-like processes projecting from the hair follicle into the surrounding tissue, is given in a paper by Drs. T. and C. Fox (*Path. Trans.*, xxx.). That volume also contains some of Dr. G. Thin's researches on the same subject.

The region specially affected by rodent ulcer is comprised within an oblong space, bounded laterally by the two auricles; superiorly and inferiorly by parallel lines across the face, connecting their highest and lowest points. The *lower eyelid* is most commonly the starting-point, but the disease may begin at any point within the space described. With comparative rarity it attacks skin of the trunk or limbs, or the short hair follicles of the genital organs. Rather singularly, the scalp, covered with long hairs, is not known to generate rodent ulcer; and the same with the pubes.

The partiality of this morbid growth for the eyelids, particularly for the lower, is mainly referable to the functional activity of the part. Cell-growth is here remarkably luxuriant in connection with the formation and quick reproduction of the cilia. In less degree it is explicable by liability to frictional irritation, or to other forms of mechanical injury. The disease shares in the conspicuous proclivity of facial, labial, and buccal epithelioma for the male sex; in women is exceptional. The patients are usually advanced in middle age, but the malady may begin comparatively early in life, by becoming grafted on an antecedent syphilitic lesion.

Small epitheliomatous sores in the upper part of the face often run a remarkably chronic course, presenting a marked contrast in clinical career to the same disease within the mouth. Beginning as a non-malignant wart, these crack and slightly ulcerate, then remain almost stationary for many years, giving little trouble and not affecting the lymph-glands. When the scab is detached, a small shallow ulcer is seen, with no marked induration of the edges, and none of the usual physical features of malignancy. Such cases are very often recorded as rodent ulcer. The distinction is unimportant and cannot be definitely established except by the microscopic examination of a thin section, which in the one case will exhibit the comparatively large cells, and diffuse infiltration of epithelioma, in the other, the branching columns of small-celled growth, typical of rodent ulcer.

The exciting causes of rodent ulcer are precisely analogous to those of epithelioma—a casual breach of surface irritated by continued friction. *Syphilis* often lays the foundation, as in

the case recorded below. The growth has been described as commencing like epithelioma in an ordinary wart. It is possible, however, that such cases were chronic examples of epithelioma, only to be differentiated as above from the lesion in question. True rodent ulcer is almost invariably an ulcer *ab initio*.

Rodent ulcer is the "least cancerous of cancers," exhibiting the phenomena of the malignant process in its mildest form. It permits many years of life, eventually terminating existence rather indirectly than directly. In the typical instance cited, the man lived for fifteen years, and then succumbed in great measure to tubercular complications. Deposit even in proximal lymph-glands is excessively rare; general blood-infection, metastases in the viscera or marrow have not been described. There are frequent pauses, and an extensive sore may wholly cicatrise over, eventually breaking out again, and similarly healing. The margins always remain hard, often knotty; although its progress is so gradual the infiltration always, unless checked by art, continues slowly but surely to extend in every direction. From the proximity of bony structures, however, in ordinary facial rodent ulcer, that extension is most conspicuous in the superficial parts, the skin and sub-cutaneous tissue. Early implication of the always contiguous periosteum presents the principal surgical obstacle to cure.

Pathologists are indebted to Dr. George Thin for first elaborately demonstrating the source of rodent ulcer. A previous erroneous ascription of this disease to the sebaceous, or even to the sudoriparous, glands probably arose from confusion with small chronic epitheliomata; which bear towards the former a close macroscopic resemblance. Under the microscope it is impossible, however, to mistake the columns of minute round or ovoid cells, for the much larger cell elements of a cancerous epithelial product. Commonly the sebaceous glands in a thin section are seen in a perfectly normal condition, invested by the advancing small-celled parenchyma.

The following case exemplifies the ordinary course of rodent ulcer; including the remote lymph-gland infection, whereof the supervention is sometimes denied.

John T., aged forty-four, was admitted into the Cancer Hospital in July 1888, with a rodent ulcer of twelve years' duration, affecting chiefly the right lower eyelid. The patient had been a soldier; and the disease had commenced in a secondary syphilitic lesion, three months after the primary attack. The sore had been repeatedly cauterised;

now covered the lower lid, a part of the upper, and a considerable patch of surface on the adjoining temple. The margin was hard, livid, and for the most part firmly adherent to the underlying bone; it was slightly elevated; partial cicatrisation had taken place in the temporal region. The general health was good. The disease was gradually spreading towards the ear, and downwards in front of that organ. The ocular conjunctiva remained healthy: there was no gland enlargement.

The man was discharged at his own request, and was re-admitted in the following December; when a round nodule of the size of a hazel-nut was found at the anterior edge of the sterno-mastoid muscle, on the right side; it was adherent to the muscle, and occupied the exact site of a superficial cervical lymph-gland. This was excised; and at the same time the elevated portions of infiltrated skin bordering the sore in both eyelids and in the temporal region were removed with the thermo-cautery. Under the microscope both the skin and the cervical nodule presented the appearances typical of rodent ulcer.

No trace of lymph-gland structure could be detected in the latter, which was found to consist of small-celled growth in columns, permeating dense fibrous tissue. From its situation and appearance, however, there could be little doubt that it was really a lymph-gland in which the lymphoid cells and reticulum had been wholly supplanted by the rodent ulcer parenchyma. Much of the shallow wide ulcer had by this time cicatrised over, the scar being adherent to the periosteum; and all that could be done by way of palliative was to excise and cauterise the growing edges. The patient was discharged in May 1889.

He was admitted for the third time in July 1890. During the interval the disease had made rapid progress; the right eye had been removed at a provincial infirmary, and chloride of zinc paste had been several times applied. The general health had begun six weeks previously to break down; there was severe and continuous pain in the huge sore, which now covered the right temple to below the ear; the right orbital cavity was filled by red granulations, and both eyelids had been completely eroded. At the site of the cicatrix in the neck was a hard "lump"; which was increasing in size. This, with the cicatricial-tissue wound soon broke down, forming a sore continuous with the primary above, and burrowing below deeply into the neck under the anterior edge of the sterno-mastoid. On November 3 sudden and profuse arterial hemorrhage took place from the deep cavity below the ear; presumably from the posterior auricular. It was only temporarily arrested by styptics. On Nov. 8 the common carotid was ligatured, with permanent arrest of the bleeding. Large gangrenous sloughs now occupied the base of the chasm in the neck. The sore partially cleaned, and there was temporary improvement in strength. On December 31 the patient began to exhibit pneumonic symptoms, and died on January 3, 1891, 15 years from the onset of his malady.

The autopsy showed a very extensive ulcer, internally passing down the nose, almost to the mouth; above, covering the right eye-brow, externally bounded by the ear; inferiorly, extending downwards for three inches below that organ, and also stretching behind the auricle. The right malar bone was laid bare, and eroded. The right orbit was filled with red granular tissue. The cavity from which the bleeding had taken place was largely occupied by new cicatricial tissue. There were extensive (old) *pleuritic* adhesions on both sides. The *left lung* was completely hepatised; it contained some small tubercular foci and cavities. The *right lung* also showed some small breaking-down cavities (tubercular) and dilated bronchi; the middle lobe was hepatised. The glands of the posterior mediastinum were softened and enlarged. There was no other visceral lesion of note. The immediate cause of death was pneumonia; in part septic, partly tubercular. The tubercular deposits had otherwise given rise to no symptoms during life, their presence having been "masked" by the cancer.

CHAPTER IX.

ENDOTHELIOMA, PSAMMOMA, ETC.

I. *Endothelioma*. (Plate XI.)

Definition.—The cancer of endothelial cells.

Synonyms (partial): “Alveolar” sarcoma, “plexiform” sarcoma (Billroth), “villous” sarcoma, “plexiform angio-sarcoma” (Waldeyer).

Endothelioma is probably the rarest form of cancer; and that whereof the genesis is most involved in obscurity. It is almost exclusively confined to the pleuræ, pericardium, peritoneum, cerebral and spinal serous envelopes. Cases have occasionally been attributed to the endothelial lining of lymphatic vessels in various parts of the body; but their validity is doubtful.*

New growths regarded as endothelial cancers arise in elderly persons seemingly under the same antecedent conditions as carcinomata; they run an acute course, and prove rapidly fatal. Their real nature is seldom or never apparent before the autopsy. The symptoms are obscure, and compatible with the supposition of a simple inflammatory attack. There is, however, a rapid and progressive increase in severity, with copious sero-gangrenous effusion into the serous cavity concerned. Sometimes the disease has followed violent injury; but, in the cases reported, the mode of causation is rarely stated.

When the *pleura* is the site, that membrane is found studded with masses of the new growth, varying in size from that of a

* The name “sarcoma” has been applied to malignant growths of endothelium, as well as to those of the connective tissues, on account of the common mesoblastic origin of both these structures.

pea to a large tumour. They are generally rounded and flattened; sometimes a continuous layer coats the membrane. Whatever the size however or form of each, it is superficial; a layer of connective tissue commonly intervening between the new parenchyma and the lung-substance. There are abundant evidences of *chronic* inflammation, in the shape of surface adhesions and fibrous bands; of *acute*, in the form of copious fluid exudation, commonly stained deeply by extravasated blood. The first symptoms noticed are those of acute pleurisy. Secondary metastases in the viscera occur in a minority of instances.

When the peritoneum is attacked, the symptoms are those of rapidly increasing ascites; and the deposits exhibit a similar superficiality, becoming diffused on the serous membrane rather than in the visceral parenchyma. Endotheliomata of the brain or spinal cord cause obscure symptoms, varying with the locality of a tumour formation; and speedily cause death. Their presence is probable when with the symptoms of grave disease, and of a rapidly growing tumour, there is a history of mechanical violence or of parturition.

The structure regarded as typical of endothelioma is that of round or oval alveoli in a connective-tissue stroma; these are lined by cells identical in appearance with cylindrical epithelium. In some cases the acini are described as packed full of cells, epithelial in form, only smaller than those of ordinary epithelioma; roundish, "resembling in size and appearance, white blood-corpuscles." Some of the acini appear to be dilated lymphatic vessels; and the microscopic phenomena seem to vary according to the origin of the cancer from the endothelium lining these, or from that on a free surface. The conspicuous acinar structure in many instances has caused the disease to be described as "alveolar sarcoma."

Occasionally the new growth is found to consist of rounded papillæ, with a basic frame-work of connective tissue, covered by one or two layers of endothelial cells. These papillæ may be united at their extremities, alveolar spaces being thus formed, which are lined, or often completely filled, by the new cell-growth. Such tumours are the "villous sarcomata" of Billroth.

Cholesteatomata ("brain-pearls") are small spherical nodules

of a peculiar lustrous appearance, like that of a pearl, which are occasionally found studding the cerebral *pia mater*. Microscopically, they consist of squamous-looking cells ranged in laminated layers. They do not appear to be in any way cancerous, but some pathologists rank them with the endotheliomata. Others regard them as dermoids, or as inflammatory products (Ziegler).

The *plexiform sarcoma* of Billroth is an obscure cancerous growth, now commonly referred to endothelium. It is stated to attack the *orbit*, the *brain*, sometimes the *parotid gland*; and by other writers has received the various designations of "cylindroma," "chancroid," "adenoid."*

Psammomata, otherwise called "calcareous tumour of brain," "calcifying endothelioma" (Mr. J. Hutchinson, jun.), are rare calcareous or fibro-calcareous tumours, found only in association with the *choroid plexus*, the *cerebral* and *spinal meninges*. In the former site they are often combined with cysts. In the latter they are sometimes flattened single and solid bosses, sometimes papillomatous vegetations. Apparently they grow slowly, and produce no symptoms except by their bulk. But

* In vol. xxxi. of the *Path. Trans.*, Mr. J. McCarthy narrates such a case, commencing as a small wart on the lower eyelid of a man aged seventy-six. He entirely discredits origin from the connective tissues, suggesting rather an epithelial source.

"Extensive plexiform cylinders, knobs, and spheres made up of small cells spread out into the surrounding connective tissue, separate the bundles and fill out the spaces between them. The earliest cells are usually small, round, or irregularly polygonal. Then a complex metamorphosis takes place; the central part of the cells around the vessels becomes a hyaline or fibrillated connective tissue, the external cells form a covering around the vessels, and then newly formed connective filaments. Thus these formations assume in a certain degree a villous form, which grows into the tissue. While this takes place, the surrounding external cells may acquire such a close resemblance to epithelial cells both as regards shape and position, that to mistake them for sections through glands, especially under a low magnifying power, is very excusable. A very remarkable appearance is presented if in single cylinders the central cellular elements in consequence of changes in their protoplasm become fully converted into a hyaline connective tissue. Then there result dendritic cactus-like growths continuous one with another, surrounded by cells, but quite separate from them. Vessels may grow into them, if the new growth does not originally proceed from vessels or grow around them. Their origin is very obscure."—Billroth, *Surgical Pathology*, New Sydenham Society, 1878, p. 413.

it is rarely possible to fix the date of inception, and even their presence is commonly detected only after death from some other disease.

Microscopically, psammomata consist of bands of fibrous tissue, forming trabeculæ, within which are *corpora amylacea* in various stages of calcification, identical with the "brain-sand" normally present in the pineal body. There is a central core of epithelial-looking cells, enclosed by a fibrillated wall, showing concentric lamination. These globular bodies closely resemble the *globes epidermiques* of epithelioma, from which they are distinguished by the lime-salts (chiefly carbonate) present in considerable abundance. They are sometimes described as containing many blood-vessels ramifying through their substance. Their fibrous-tissue elements are usually continuous with those of the adjacent membrane or its prolongations into the nerve-tissue. Some increase in the neuroglia around has been noted.

Although the absence of all ill symptoms is the rule, Mr. J. Hutchinson, jun., describes in the *Path. Trans.*, xxxii., a psammoma in the dorsal region of the cord which caused fatal paraplegia. The patient was a woman aged forty-eight.

Although believed to be endothelial products, these tumours do not produce metastases, and have no other attribute of cancer. They hence must be distinguished from the malignant endotheliomata.

Pleural Endothelioma.—A typical case is recorded by Dr. Joseph Coats, in the *Glasgow Med. Journal*, 1889. The patient was a labourer, aged sixty-four. The physical signs denoted effusion into the right pleural cavity, from which forty-one ounces of sanguineous serum were withdrawn by paracentesis. After death, the right pleura was found covered by innumerable whitish tumours, varying in size from that of a pea to large masses; sometimes the new growth formed a flat continuous layer. The right pleura was alone affected, and for the most part its surface only; there were no deposits in the lung-substance, or within other viscera. The microscopic appearances were those of alveoli filled with comparatively small "epithelial" cells, and a connective-tissue stroma. In some places the cells were placed in rows, forming elongated processes; in the larger tumours, they usually occurred in rounded or oval masses. There was always a layer of connective tissue between the morbid parenchyma and the lung-substance.

See also case by Birch-Hirschfeld, *Lehrbuch der Path. Anat.*, Bd. ii. Nielsen records five cases complete, and three incomplete, of pleural

endothelioma (*Deutsches Archiv für Klin. Medicin*, Bd. xxi. 1882). In all the pleura was greatly thickened, with abundant surface-adhesions or bands; the appearances indicated inflammation, both acute and chronic. The tumours were sometimes distinct and isolated, sometimes flat elevations, sometimes in the form of dense strands forming a network. In the last-named condition, the lymphatic vessels were regarded as the substratum; the disease being considered to originate in their endothelium. In several metastatic deposits, in lungs, lymph-glands, liver, or muscles were found. Vol. xxxix. of the *Path. Trans.* contains a valuable case by Dr. G. N. Pitt, in which the whole body was carefully searched, and conclusive evidence obtained that the pleura was the primary site of the cancer. The microscopic appearances were those of a "cylindrical-celled epithelioma." There were abundant secondary deposits in the mediastinal glands; also in the liver, jejunum, diaphragm, and pericardium; none in the lung. "A chain of infected glands was traced from the groin up the aorta to the pleura."

Peritoneal Endothelioma.—Under the heading "primary scirrhus of the peritoneum," vol. iv. of the *Path. Trans.* contains a typical example of the above, reported by Dr. Bristowe. The membrane was everywhere infiltrated by a malignant new growth, most abundant in the omentum, which was greatly thickened. The abdominal cavity contained three pints of clear serum. There were metastatic deposits in both pleurae, and in the muscular tissue of the diaphragm; in the viscera, none microscopically; the cancer consisted of a dense fibrous matrix, enclosing circular or oval spaces, filled with nucleated cells.

A case of primary endothelioma of the *Pericardium* is reported by Dr. Norman Moore in the *Path. Trans.*, xxxv. The patient was a man aged thirty-seven, a chimney-sweep.

A case of "primary cancer, or endothelioma of the brain, in connection with the peduncles and pons" is recorded in the *Path. Trans.*, xxxix., by Dr. Joseph Coats. The patient was a woman aged thirty-two, who after parturition suffered from extreme pain in the head, with ptosis, deafness, and cerebral symptoms. At the autopsy, an oval whitish tumour $1\frac{3}{8}$ inch by $\frac{7}{8}$ in. was found beneath the corpora quadrigemina; it was composed of cylindrical cells in rows or enclosing spaces. These were strongly suggestive of the endothelium lining the ventricles and the central canal of the cord. The tumour was believed to have sprung from the endothelium lining the aqueduct of Sylvius; it was soft, and the centre breaking down.

Two cases of "diffuse sarcoma of the spinal pia mater," presumably endothelial, are recorded, in vol. xxxviii. of the *Path. Trans.*, by Drs. Coupland and Pasteur. In one, a girl aged $4\frac{1}{2}$, a tumour filled the whole sub-arachnoid space from the cervical region to the cauda equina. In the other, a young woman aged twenty-two, the whole membrane was profusely studded with nodules, composed of small round cells embedded in a stroma. The symptoms in the former instance dated from a fall. In a case by Mr. Eve (*Path. Trans.*,

xxxiii.), the *cerebellum* was the site; the patient was a young man of thirty.

A malignant tumour in the *liver*, regarded as of endothelial origin, is described in the *Illustrated Medical News* of April 6, 1889, by Dr. McKee. Klebs (*Allgemeine Pathologie*, Theil ii. 634) figures an "endothelioma," arising in the capsule of the *sub-maxillary gland*.

Probably many of these exceptional and perplexing cases affecting the central nerve-structures, will in the future be referred to the embryonic group of cancers (Blastoma). On the pleuræ and peritoneum, the *germinating endothelial cells* are the most probable source of the cancer-process. But on this point nothing certain is at present known.

CHAPTER X.

SECONDARY VARIETIES OF THE PRECEDING, CHARACTERISED BY
. PECULIAR DEGENERATIVE PHENOMENA.—MELANOTIC CANCER.
COLLOID CANCER.—MYXOMA.

I. *Melanotic Cancer*: (a) *Epithelial*—(b) *Sarcomatous*.

Definition.—The cancer-product of cells which normally secrete melanine.

Cells which contain the peculiar pigment called *melanine* occur in quantity only in the skin and eyeball. In the former, they are epithelial; in the latter, they belong to the connective tissue. Melanotic cancer therefore is almost wholly restricted to these two sites. In the former it is a variety of Epithelioma; in the latter it is a true Sarcoma.*

(a) *Epithelial Melanotic Cancer*. (Plate IX.)

In the healthy skin, pigment is present in the Malpighian rete; being most abundant in the layer of columnar cells which constitute the innermost stratum of that structure. It is absent from the corium, with the occasional exception of a casual migratory cell. The stratified cells of the rete are but slightly pigmented, and it is to the columnar that this cancer-variety must be specially referred. Its inception is best studied by a consideration of the structure of those non-malignant excrescences known as pigmented warts, from which it most commonly springs.

* According to Quain's *Anatomy*, pigment-producing cells are also found in the membranous labyrinth of the ear, in the olfactory region, in the pia mater on the upper part of the spinal cord, in the medullary substance of lymph-glands, and in the spleen; under pathological conditions, in migratory cells found in the corium, &c. Such are always scanty, however, and are not known to generate malignant disease.

These little tumours consist of a central stalk or core of fibrous tissue continuous with the corium. They have an epidermic covering, which differs from that of the ordinary integument, in that the inter-papillary processes branch inwards in every direction, inosculating with each other. The substance of the wart is everywhere permeated by these epidermic processes; which constitute the greater bulk of the whole. Often villous fringes, similarly consisting in the main of epithelium, are attached to a slender peduncle. The fibrous-tissue core is free from any trace of pigment. The abundant melanine which confers the well-known black or swarthy coloration, is confined to the deeper layers of the rete. Prior to cancer development, there is no abnormal hyperæmia.

When malignancy supervenes, its earliest indications consist in augmented vascularity, and in a superabundance of pigment in the columnar cells. These are found to have increased in number and to be actively proliferating. At many spots in the section the continuity of the layers is broken, the cells there having descended into the corium, where they form little clumps. Sometimes their connection with their original site is, for a time, maintained by a narrow cell-pedicle, and they project from the inter-papillary processes in a racemose manner. By degrees they become isolated from the rete, and entirely invested by the corium. While in this stage, the individual cells retain their columnar shape: clusters of leucocytes abound. The "clumps" are very brightly stained by the usual dyes.

In the third stage, the cell-clusters are seen to be of the usual blackish-brown hue, wholly converted into pigment. They thickly fringe the inter-papillary processes in the neighbourhood of the advancing cancer; and these processes have entirely lost their deep border of columnar cells. Thence rays and irregular branches of pigment extend into the corium and subcutaneous fat. The processes soon become obliterated, a thin level surface-covering of epidermis, with only scanty traces of a Malpighian layer, still remaining. That in turn is swept away by the progressive ulceration, and the underlying tissues

* Sir James Paget (*Surg. Pathology*) comments "on the close correspondence between the pigmentary moles, and the warts that are apt to become the seats of epithelial cancers."

are invaded by the new cells, which now betray no resemblance to the original columnar form.

In melanotic cancer of the integument there are no *globes epidermiques*, the mucoid degenerative process being here replaced by a conversion of cell-protoplasm into pigment. Moreover, we do not see large columns of new cells penetrating from the surface into the deeper parts, as in epithelioma of the ordinary type. Large carcinomatous-looking cells, irregularly rounded, with multiple nuclei of various shapes and sizes occupy the tiny meshes of a connective-tissue stroma; either singly or in clusters of two or three. Hence melanotic cancer of the integument is often described as "alveolar (melanotic) sarcoma." This locular arrangement is particularly well-marked when the section has been taken from a secondarily implicated lymph-gland. Huge multi-nucleated corpuscles abound.

The process of degeneration commences in the nuclei, which gradually break down into minute brown granules; it is easily traceable in individual cells. The newest and most potent of these are brilliantly stained by logwood, and wholly free from pigment; those of earlier date show here and there a few tiny granules in one or in more of their multiple nuclei; whereas, in the oldest still coherent as cells, the whole of the nuclei with their investing protoplasm have become changed into a brown granular mass. Minute specks or larger fragments of the degenerate cells, dot the septa of the connective-tissue stroma.

The *pigment* is identical with healthy pigment (melanine); being soluble in alkaline solutions, from which it is again precipitated by acids. It bears no relation to hæmatine, and does not influence the composition of the urine. On the other hand, the phenomenon known as "spurious melanosis" is the result of extravasated blood, and may occur in any very vascular malignant growth, as breast-carcinomata. Although the latter tumours may closely simulate the true melanotic cancer to the naked eye, appearing throughout of a deep black hue, the resemblance vanishes in the process of preparation for the microscope, which will also demonstrate the absence of pigment-granules in the nuclei. Here the colour is a hæmatine product, and not derived from protoplasm. When the condition is extreme

it may render the urine dusky, as in ordinary hæmaturia or hæmoglobinuria.

The cut surface of an epithelial melanotic cancer is of various shades, from brown to a deep black, in proportion to the abundance of the melanine. The coloration is generally fairly uniform in the primary growth. In the secondary deposits, however, it is very unevenly distributed. While some of these have undergone the degeneration throughout, others will be found free, to the naked eye, from any pigmentary change; whereas many will show brown or black areas side by side with the usual whitish parenchyma of an epithelioma. The degree in which these metastases, in lymph-glands or elsewhere, have undergone conversion is a measure of their respective ages.

Melanotic cancer of the integument, like other epithelial disease, implicates the nearest lymph-glands, at a very early period, *per* the lymph-channels. General blood-infection follows as a consequence of the former; and, after death, the metastases are usually very numerous indeed. The disease affords one of the most acute cancer-types; yet the primary lesion is commonly trivial, and is permanently eradicated without difficulty. Death is often wholly due to the secondary infection phenomena; all the vital organs being permeated throughout by metastases.

Diffuse pigmentation of the subcutaneous connective tissue is a rare occurrence. The skin adjoining the pigmented wart or mole which was the starting-point of the disease, becomes slightly puffy, and deeply pigmented without induration. In an extreme instance, apparently of this character, reported by Dr. Phineas Abraham (*Brit. Med. Journal*, Jan. 2, 1892), a woman of thirty-five had the "whole skin of the face, excepting that over nose and lips, enormously swollen into a purplish brown, pudding-like mass, ulcerated at one or two spots." There were numerous pigmented brown elevated patches on the face; and (secondary to these) on the trunk and extremities. (See also p. 181.)

Marrow-infection, often insidious, is common. (See p. 180.) The *causes* coincide with those of epithelioma; excepting that some abnormal accumulation of melanine in a mole, warty mole,

or degenerate naevoid growth, appears necessary as an antecedent.* The more prominent this is, the greater the liability to frictional irritation.

Dissemination by the sub-cutaneous tissue, with the formation of multiple nodules on the trunk and limbs, is frequently seen. The growths vary in size from a pin's head to that of an orange; and several hundreds have been counted.

(b) *Melanotic Sarcoma.* (Plate VI.)

The only locality in which melanine abounds in connective-tissue corpuscles is the eyeball. True melanotic sarcomata, unless in very rare instances, arise only in this organ.†

They are practically spindle-sarcomata + the special pigment; consisting of fusiform cells, ranged in regular bands. The latter have multiple nuclei, thickly charged with melanine, and, as in the cutaneous disease, the surrounding fibrous tissues are laden with granules and larger fragments of the disintegrated and degenerate cells. The degree of pigmentation varies in individual specimens.

The eye-disease is of similarly acute type to the cutaneous, and gives rise to an exactly similar train of infected phenomena, with the conspicuous exception that the adjacent lymph-glands do not enlarge except as the result of direct infiltration by contiguity, or as the consequence of general blood-infection. The *parotid* and *zygomatic* glands are exposed to direct invasion. The *choroid* coat is the usual starting-point of the malignant

* A mole or pigmented wart is often but the sequela of a naevus.

† Naevi and remnants of included foetal structures may undergo melanotic degeneration; and it is possible that their presence may account for melanotic tumours, described as sarcomatous, in the pharynx, lips, intestinal canal, &c. Some of the older cases thus recorded were probably, however, examples of "spurious melanosis"; in others, as when the liver is said to have been attacked, it is highly probable that the disease was epithelial; and the pre-existence of a small cutaneous primary lesion had been overlooked.

The bulk of the eye-pigment resides in the connective-tissue corpuscles of the *choroid* coat, with its prolongations, the *iris* and *ciliary processes* (uveal tract). In dark persons, the *lamina fusca* is also pigmented; also the endothelium of the anterior surface of the iris, that of the *tapetum nigrum*, and (slightly) the epithelium of the conjunctiva. None but the connective-tissue structures are known to develop cancer; though there is no reason to doubt that exceptions may from time to time occur.

tumour, which grows inwards between the choroid and the retina, rapidly implicating all the structures with which it comes in contact. From the tension thus involved, very severe pain is an early symptom.

Mr. Oliver Pemberton's *Observations on Cancer*, 1858, part i., still form the most important monograph on melanotic cancer. The following is an analysis of his sixty cases; in which cutaneous and ocular growths are classed together.

Fifteen of thirty-four cases arose in a "congenital mole, wart, or mark."

Of sixty patients, thirty-three were male, twenty-seven female.

The skin or sub-cutaneous tissue was attacked in seventeen males and seventeen females.

The eye was primarily diseased in eleven males and seven females.

Under 10	years of age	.	.	males	2	females	2 = 4
Between 10-20	"	"	"	"	—	"	1 = 1
" 20-30	"	"	"	"	2	"	2 = 4
" 30-40	"	"	"	"	10	"	2 = 12
" 40-50	"	"	"	"	6	"	8 = 14
" 50-60	"	"	"	"	7	"	6 = 13
Above 60	"	"	"	"	5	"	4 = 9

57

In three the age is not stated; in five, the site. Three are referred to the *rectum*, *prostate* and *testis* respectively.

The earliest case recorded was one affecting the left eye of a little girl aged two years. There was similar disease in a female child of three.

Of thirty-three cases in which an autopsy was performed, metastases were found in the lymph-glands in eleven; liver, in eighteen; lungs, seventeen; serous membranes, fourteen; sub-cutaneous tissue of trunk and limbs, ten; the sub-serous tissue of cavities, five; heart, nine; brain, seven; pancreas, seven; kidneys, seven; spleen, three; ovaries and testes, four; penis, fibrous membranes, supra-renal capsules, and thyroid body, one each.

Of the bones, the *cranial* were implicated in five instances; the *ribs* in four; the *clavicle*, *femur*, *upper jaw*, and *sternum*, each in one. The case of a man aged fifty-one, whose right eye had been extirpated, is detailed. One of the *ribs* was completely black, as was also the sternal third of the *left clavicle*; "but these bones were in no other way altered from their natural state." A woman aged forty-two had a black discoloration of the *sternum*, anterior part of *ribs*, and of some of the *cranial* bones on their inner surface. In a case of disease in the labia, pigment was found in the cancellous tissue of the *ribs*, and there was deposit in the *left femur* of another melanotic patient.

Of twenty-five cases quoted by Paget (*Surg. Pathology*), seventeen were in females, eight in men. The ages were: under ten, 2; ten to twenty, 1; twenty to thirty, 7; thirty to forty, 4; forty to fifty, 5; fifty to sixty, 4; above sixty, 2.

Distribution by the blood of melanotic particles is well shown by Mr. Rickman Godlee, in plate 2 of the *Path. Trans.*, xxiv.

An exceptional period of metastatic latency is shown by a case in the *Path. Trans.*, xxv. A man's eyeball was excised for a "spindle-celled sarcoma of the choroid" in 1862, by Mr. Hulke. In 1871, he consulted Dr. Murchison for a "recurrence" in the liver, noticed eighteen months.

Of extensive dusky coloration of the skin, a case similar to Dr. Abraham's is reported by Dr. Wickham Legg in the *Path. Trans.*, xxxv. Case four of my own lecture on "melanotic cancerous disease" (*Lancet*, Oct. 15, 1892), presented an approximation.

A case of melanotic epithelioma in the *upper lip* of a woman, aged thirty-seven, is recorded by Drs. Mott and Stevens in the *Path. Trans.*, xxxvii.

When a pigmented wart has been surgically destroyed, hospital patients are commonly ignorant of any connection between this and the subsequent metastases of the disease, such as lymph-gland enlargement; and, until pressed, fail to disclose the prior existence of the apparently insignificant primary lesion. This is the probable explanation of the cases reported as "primary melanotic carcinoma of the liver." In one of these detailed in vol. xxxviii. of the *Path. Trans.*, the presence of several pigmented moles on the body is noted.

Pigment-granules in the blood and urine of patients with melanotic cancer were described by Nepven (*Mémoires à la Société de Biologie* 1872); and Clausel (*Thèse de Paris*, 1874). With the exception of two unsatisfactory cases (in one of which dusky coloration of the urine was apparently due to hæmatine) by Dr. Hilton Fagge (*Path. Trans.*, xxviii.), these observations have not been corroborated by English pathologists. In all the melanotic patients treated at the Cancer Hospital during the past ten years, the urine has been found perfectly normal.

A case regarded as "melanotic sarcoma of the hard palate" is recorded in the *Path. Trans.*, xxxviii., by Mr. F. Treves. The patient was a woman aged fifty-eight; the condition of the eyes is not noted. In the pharyngeal region, vestigial remnants are common, and prove the source of various abnormal new growths. (See case of "Papilloma of tongue, with naevoid structure at its base," Mr. Wagstaffe, *Path. Trans.*, xxvi.).

In Addison's disease, pigment is limited to the cells of the rete (Greenhow, *Path. Trans.*, xxiv.); as also in the skin of the healthy negro.

Hausemann, in Virchow's *Festschrift*, states that, in health, cell-division is practically limited to the two lowest layers of cells in the rete Malpighii; mitoses being rarely found in the higher.

"*Melanotic Cancer without the Pigment.*"—There is reason to believe that, in some instances of cancer developed from the cells of the rete, the amount of pigment may be very small, and may be easily dislodged in process of preparation for the microscope. There will then be no coloration appreciable by the unaided eye. Sir James Paget (*Surg. Pathology*) speaks of having found, "in cancers that look colourless to the naked eye, single cells or nuclei having the true melanotic characters." An example seemingly of this occurrence was reported by Dr. Wightwick to the Hunterian Society in Dec. 1891. The quantity of melanine in sarcomata of the uveal tract is also very variable; and pigmentation may be disclosed only by the microscope.

In the human species, the presence of pigment in a tumour denotes cancer. Old horses and ponies however are subject to "fibrous tumours containing black pigment in abundance"; but believed to be benign. Occasionally also dogs. An important paper on "pigment deposits in the skin," by Dr. Laycock, will be found in the *Med.-Chirurg. Review*, xxvii.

In my published paper above referred to (*Lancet*, Oct. 15, 1892), will be found a brief report of several cases which illustrate the usual course of melanotic epithelial cancer, its mode of causation, insignificant primary source, partial pigmentation of metastases, and differentiation from the ocular sarcoma.

II. "*Colloid Cancer.*"

Synonyms (obsolete): *Alveolar Cancer*, *Gelatiniform Cancer*. (Modern): *Carcinoma Myxomatodes*. (Plate XIII.)

The term colloid (κολλωδης, from κολλη, glue) designates a rare variety of malignant growth, in which the cells of what was originally a carcinoma are found to have undergone a peculiar transformation into a jelly-like material. Much in its etiology and pathology still awaits elucidation. By some of the older pathologists, notably by Mr. Sibley, the disease was not regarded as cancerous. The most salient features of a characteristic specimen are: (a) The peculiar "jelly"; (b) The locular structure whence the alternative title was derived.

The glue-like material in its most typical form is yellowish or yellowish green in colour, glistening, and translucent. It may, however, be opaque-white, or perfectly colourless, or stained of various hues by hæmatine. On the one hand, it may be firm, solid, and dry to the touch; of the consistence of hard-boiled dough; or on the other it may be soft, and closely

resemble jelly, occasionally even adhering to the fingers like viscid mucus.

This substance is found within the meshes of a fibrous or fibrillated stroma: the bands of which often are whitish and opaque, contrasting with the glistening jelly. In the best-marked examples of the neoplasm, the alveolar appearance of a cut surface is thus a notable feature. The loculi may be relatively minute, though always easily visible to the naked eye; of such a tumour, the section reminds us of a honeycomb, or of rice boiled hard into a single mass. The tiny pellets of colloid substance are dislodged from their beds on slight pressure. On the other hand, the meshes may be huge; and on a free surface, as in the peritoneal cavity, each may present a cystoid appearance. The former extreme is most often seen in mammary, the latter in peritoneal, colloid. The alveoli have been graphically described by Mr. Sibley as varying from the dimensions of a red blood-corpuscle to that of a hen's egg; their shape is round or ovoid.

Under the microscope, the walls of the alveoli appear fibrous or merely fibrillated; or perfectly homogeneous. Usually they are laminated concentrically, thus resembling the fibrine-layers of an aneurism, or the transverse section of a tree. The lamination becomes more apparent upon the addition of acetic acid to the thin section. The feature presents analogy to the imbrication of the epithelial *globes epidermiques*, another mucoid degeneration-product.

The colloid substance is faintly granular, and, in the main, structureless. A few degenerate cells of carcinomatous type, however, still subsist, constituting a small cluster, which occupy the centre of the loculus, or (less often) may be attached to some portion of the wall. These are oval or spherical, containing a relatively large nucleus, which resists the action of staining re-agents, and is rendered more obvious by acetic acid. They are always scanty and may be wholly wanting. Large oval bodies may be present; they consist of super-imposed laminae, with a single nuclear body at the extremity. Such have been designated "colloid corpuscles." They closely resemble the epidermic *globes* of epithelioma, and appear to be substantially identical in structure with the latter.

In addition to its cell-elements, the jelly of colloid cancer almost always contains crystals of *cholesterine*, with oil-globules and round opaque granules of *phosphate of lime*. Crystals of *triple phosphate* may also occur. *Sulphur* has been found. In a case of abdominal colloid copiously reported by Drs. Quain and Jenner (*Path. Trans.*, ii. 319), the substance was found to abound in that element and in *nitrogen*, with a very small proportion of *albuminate of soda* and of insoluble *albumen*. On prolonged boiling it yields no gelatine—a character differentiating it from the myxomatous degeneration of connective-tissue growths. The jelly is not affected by water or by alcohol; has little tendency to putrefaction; by acetic acid is rendered opaque and extremely tough.*

Well-marked examples of colloid, with locular structure and concentric lamination of the alveolar walls, are almost wholly restricted to two localities—the *abdominal viscera* and the female *mamma*. The former are most frequently the site, and of these again, the *stomach*, *ovaries*, and *rectum* are most prone to attack. Any portion of the bowel may originate the disease. The omentum is often occupied by large colloid masses, cystic or semi-cystic in form, but these are usually, if not always, secondary to primary colloid of other parts, such as the ovaries or stomach. Comparatively seldom, the *prostate* and *bladder* have been thus affected.

When the ovary is the starting-point, the tumours exhibit the tendency to cyst-formation which characterises most new growths in that organ. The cysts, moreover, are apt to become ruptured into the peritoneal cavity. This *Auto-inoculation* is a not infrequent event, and the entire surface of the serous membrane may be found studded with large and small colloid masses, many of which have evidently thus originated. Masses of the "jelly" are also found free within the cavity, alone or mingled with ascitic fluid. Colloid growths within the stomach or intestines betray the same phenomenon, small portions of the primary tumour becoming detached, carried down the canal

* It is uncertain whether *sulphur* is always, or is even often, present in colloid substance. Few analyses appear to have taken place; so far as I can ascertain, none has been attempted for many years. The text-book distinction founded on this characteristic needs verification.

and grafted at various spots below. When the peritoneum becomes infected by colloid the secondary masses often far surpass, in bulk, the primary, and the case runs an acute course.*

In the female breast colloid tumours are ordinarily much more chronic in their career than when connected with the abdomen. They may betray hardly any feature of malignancy until their weight or bulk suggests recourse to surgical aid. When no cysts are present and the whole of the malignant parenchyma has undergone the colloid transformation, the tumour forms a round or ovoid mass, presenting to the touch a degree of hardness many degrees more extreme than the familiar induration of scirrhus, and comparable to a smooth water-worn pebble embedded in the breast-tissue. It is painless, localised, does not infiltrate the adjoining tissues or infect the axillary lymph-glands until after the lapse of many years. Distant metastases are rare; a simple operation suffices to eradicate the disease. Ulceration is very exceptional; when it does occur the glue-like material forms a thin coat on the surface of the sore. There is little or no hyperæmia of the surrounding parts. When cyst-formation complicates the mammary lesion, or when parts only of the parenchyma are transformed into the colloid material, the case runs a more acute course than under the preceding conditions. It is now clinically on a par with ordinary scirrhus carcinoma, quickly infects the lymph-glands, emits metastases, is more apt to re-appear after seeming removal.†

* In a typical case by Dr. Ballard (*Med. Chirurg. Trans.*, xxxi. p. 119); a fall downstairs by a woman aged fifty-five, was followed by colloid cancer. Death ensued in 1½ years. Six quarts of gelatinous material were removed at the autopsy from the peritoneal cavity. The *left ovary* formed a large sac; the *right* was replaced by a mass of cysts, with gelatinous contents. Abundant cysts of like character were found studding the serous membrane; especially over the *spleen*, the left lobe of the *liver*, and the *stomach*.

† Earlier reports of "colloid cancer" in various localities other than the two above mentioned, must be regarded with suspicion. Thus, a case by Dr. Warren (*Med. Chir. Trans.*, xxvii.) has been authoritatively quoted as an instance of wide dissemination; the pericardium, kidneys, testes, liver, lungs, diploë, mediastina, ribs, intercostal muscles, and sub-cutaneous tissue having been studded with numerous small gelatiniform bodies. Reference to the published details show that the disease was certainly not cancer, but most pro-

The distal metastases of colloid, whether the breast or abdominal organs be primarily attacked, are always of small extent and limited range. Often, secondary tumours of this character, due to distal conveyance by the blood-current or lymph, are wholly wanting. Hence the hesitation of the older pathologists in recognising the malignant nature of the disease.*

Cysts in the thyroid body contain a mucilaginous fluid, the normal gland-secretion. This comprises various forms of alkali-albumen, with water, salts, and paralactic acid. It is soluble in acetic acid, is a secretion *sui generis*, having nothing in common with the superficially similar colloid "glue." To these, sometimes but not always associated with cancer, the title "colloid" has been improperly applied, as also to the fluid-contents of ranulæ, bursæ, tendon-ganglia, &c.

Essentially colloid cancer is but an ordinary carcinoma, in which the cells have undergone mucoid degeneration. It is thus analogous to the similar transformation of connective-tissue tumours which result in the condition known as myxoma, and to the transformation, on a microscopic scale, of new epithelial cells, which occasions the *globe epidermique*. When the degeneration is far advanced, it is not always easy to discover whether the disease arose in glandular cells or is of connective tissue. In each case, the pathological product may closely correspond, even in microscopic features.†

That the "jelly" is a degeneration-product, and not, as formerly held, a secretion, is proved by microscopic evidence. In many instances, the conversion of the parenchyma into colloid material, has, when the life of the individual is in question, a distinctly conservative tendency. Sometimes, indeed, as noted in the mamma, it seems wholly to arrest the cell-proliferation, and the onward progress of the disease. Even bably of parasitic source. A similar explanation seems indicated, when colloid cancer has been referred to the bones, uterus, kidneys, or liver-parenchyma. The "colloid" growths of the parotid would now presumably be recorded as myxomata or myxo-chondromata.

* For case of colloid cancer of the stomach, with minute metastases in lungs and liver, see *Path. Trans.*, xxxiv. (Dr. Pye-Smith).

† See three cases reported by Mr. F. S. Eve, in the *Path. Trans.*, xxxvii. In two, the breast was the site, in one the omentum. The former were regarded as carcinomatous, the latter as a connective-tissue product. All presented the typical characters of "colloid cancer."

in abdominal cases of brief duration, metastases in distant viscera are somewhat exceptional, and hardly ever of any bulk or importance. In the latter, however, death is accelerated by the rupture of cystic masses, primary or secondary, into the serous cavity, with the ready reception by the peritoneum, of "auto-inoculative" grafts.*

Of the causes which involve the wholesale transformation of malignant parenchyma into the mucoid substance or substances, nothing is known. This may, however, be most plausibly regarded as a natural function of the cells concerned,† carried to an extreme, in consequence of some individual idiocyncrasy.

It is worthy of note, that, in ordinary cases of cylindroma, each quasi-follicle of the malignant tumour is seen to contain a small plug of amorphous material lying loose within the lumen. This is the product of its lining cubical epithelium. If a thin section of any rectal cylindroma be compared with one of typical colloid from the same locality, it will at once be evident that the colloid condition is but an exaggeration of the former. (See Plate X.) The phenomena of melanotic cancer also countenance the view of a hyper-secretion.

The concentric lamination, in well-marked cases, of the alveolar wall, was attributed by Mr. Sibley to an "endosmosis, at irregular rates of progress." It is, however, closely paralleled by the corresponding condition of an epidermic *globe*, and is susceptible of a precisely similar explanation (p. 65).

III. *Myxoma*.

Synonym (obsolete): Fibro-cellular tumour.

The term "myxoma" has been applied to at least two distinct species of new growth.

The "pure myxoma" can hardly be classed with the cancers. It is composed of a skeleton fibrous-tissue stroma, the meshes of which enclose a colourless jelly. The latter presents all the reactions of mucine and differs little from healthy mucus. It is

* For typical example of auto-inoculation, see case by Dr. W. H. Dickinson in the *Path. Trans.*, xii. 93.

† Mr. Eve attributes the colloid change in carcinoma, at least in some instances, to a mucoid or myxomatous degeneration of the connective-tissue stroma, not of the cells (*Path. Trans.*, xxxvii.).

coagulated by heat and by acetic acid; with mineral acids it forms a precipitate soluble in excess; shaken up with alcohol it floats in slender shreds. It is considered to be analogous to the vitreous humour of the eye, and to the Whartonian jelly of the umbilical cord.

Pressed out on a slide in its natural state, and examined under the microscope, the gelatinous substance shows oil-globules, cholesterine-crystals and perhaps a few fusiform cells. In addition, stellate or branching cells, with long slender prolongations inosculating so as to form a delicate network with wide meshes, may be found. Or the jelly may be permeated by a loose framework of branching fibres, or of very elongated spindle-cells, joined to one another. A glairy mucilaginous fluid runs out or is easily expressed, when the tumour is incised. After maceration in alcohol, a cribriform stroma, devoid of cells, alone remains.

Tumours of this structure occur, among other sites, in the parotid gland, labia, sub-cutaneous tissue, and intermuscular spaces of thigh and shoulder. They have been recorded as occurring in the female breast, brain, even in bones; but such probably belonged to the second (malignant) class. The gelatinous polypi of mucous membranes present a superficial resemblance to the myxoma; and may be similarly derived from the connective tissues. Often, on the other hand, they consist of hypertrophied gland-tissue, which has undergone a mucoid degeneration. Pure myxomata are strictly localised, are often encapsuled, do not infiltrate surrounding parts or emit metastatic deposits, involve no "tendency to death."

Myxomata of "mixed" structure contain the same gelatinous material, *blended with the cell-elements of the spindle-sarcoma*. Some of the tumours, to the naked eye, closely resemble the preceding, being wholly composed of "jelly," translucent, or yellow, or variously tinted by hæmatine. The microscope shows more or less numerous embryonic spindle-cells. Much more frequently, however, the cut surface shows tracts of the latter mingled with others of opaque-white granular sarcoma-tissue, betraying the usual characters of the cancer-species referred to. The translucent parts may be somewhat fibrillated, owing to the presence of fibrous-tissue septa. Many spindle-sarcomata approximate to

this condition. Cysts are not uncommon, and may form the main bulk of the tumour. In the *parotid* and the *scrotum*, cartilage may occur; of vestigial source.

These masses are in effect spindle-sarcomata, the growth of which has been partially arrested by degeneration. Hence they advance slowly, but prove ultimately fatal.

They may ulcerate, fungate, or slough; may involve severe hæmorrhage; ultimately produce visceral metastases, do not infect the lymph-glands except by direct invasion, or by way of the blood.*

* The "carcinoma myxomatodes" of Ziegler appear to be identical with colloid cancer. (See case in the breast of a woman aged sixty, by Mr. Edmunds, in *Path. Trans.*, xxxviii.)

CHAPTER XI.

RARE AND OBSCURE FORMS OF CANCER.—DISEASES ALLIED TO CANCER.

- I. Thyroid Cancer.
- II. Cheloid.
- III. Kaposi's disease (*Xeroderma Pigmentosum*).
- IV. Dühring's Neoplasm (*Granuloma Fungoides*).
- V. Multiple Polypi of the Skin. Mollusum Fibrosum or Fibroma Mollusum.

I. *Thyroid Cancer.*

Definition.—A malignant new growth originating in the thyroid body, and producing metastases of thyroid tissue.

Few examples of this rare disease are on record. It occurs in elderly individuals, sometimes after injury: appears to be usually if not always consecutive to an ordinary bronchocele; and the symptoms are sometimes associated with those of exophthalmic goitre. After a general or partial enlargement of the thyroid body, which has given no trouble, and has remained quiescent for a term of years, rapid and progressive increase takes place. There is severe pain and depression of the vital powers. In a short time, other tumours are discovered in distant parts, notably in the bones; sometimes in the lymph-glands and viscera. Life quickly terminates.

The tumours are often pulsatile, in two cases cardiac hypertrophy has been noticed; in one, a basic murmur, and pulsation in all the cervical vessels. After death, both primary and secondary lesions are found to consist of tissue exactly resembling that of the normal thyroid.

Attention to this thyroid metastasis was first prominently excited by Cohnheim (Virchow's *Archiv*, lxxiii. 1876). In his case, isolated tumours occurred in the thyroid body. These had undergone much "colloid" metamorphosis, and were associated with similar reproductions of thyroid tissue in the *vertebræ*, *femur*, *lungs*, and *bronchial glands*. One of the thyroid tumours was found to project, in the form of a small bud-like prominence, into a large vein, a branch of the inferior thyroid.

A similar instance had, however, been previously recorded by Max Runge (Virchow's *Archiv*, lxi. 1876). An enlarged thyroid had given rise to metastases in the *atlas* and *axis*; the specimens had been examined by Recklinghausen. In Langenbeck's case (*Archiv für Klinische Chirurgie*, xxiii., secondary deposit in one *humerus* was associated with a thyroid tumour, in a woman aged fifty-four, who had been affected by a simple goitre for five years.

A third example is reported by Mr. Henry Morris (*Path. Trans.*, xxi.). The patient was a needlewoman, aged forty, whose thyroid body had been generally enlarged for many years. Two years before examination she had fallen, striking the left side of her head; one month afterwards, a tumour, hard, painless, as large as a nut, was noticed on the *left parietal bone*. Increase was slow, but continuous; then a second tumour appeared, nearer the temple; eventually the two coalesced and grew rapidly. When first seen, a prominent soft pulsating tumour occupied the locality mentioned; over it the skin was of a purplish blue colour, and there were large distended veins near. The sight of the left eye was impaired, and dull headache was complained of. All the superficial cervical vessels pulsated strongly, and there was a basic murmur. Secondary deposits subsequently made their appearance in the *left femur* (upper extremity), and over the *sternum*; these also pulsated. Death took place (from bronchitis, it is stated) six to seven years after first appearance of tumour. The autopsy revealed another previously unsuspected tumour, springing from the inner condyle of the *right femur*; the sternal growth proceeded from the inner end of the *right clavicle*, the sternum itself being free. The cranial mass, now very large, originated, seemingly, in the diploë. There was an

enlarged gland in the posterior triangle. The *heart* was very conspicuously hypertrophied.

Dr. Joseph Coats has reported another example in vol. xxxviii. of the *Path. Trans.*, under the title, "A Case of simple diffused Goitre, with Secondary Tumours of the same structure in the Bones of the Skull." The patient was a laundress, aged forty-six, who had suffered from goitre, most conspicuous on the left side, for sixteen years. There was no history of injury. One and a half years before inspection, very extreme pain was felt in the occipital region; this was shortly followed by the appearance of a tumour. When first seen, a prominent pulsating mass occupied the spot indicated; it varied in size. The chief symptoms were restlessness, irritability, with delusions. The pulse was very forcible. Subsequently the temperature was heightened, sometimes reaching 104.5°F .

After death, both lobes of the *thyroid* body were found generally hypertrophied, while there was only a slight trace of the intervening isthmus. There was considerable calcification; the left lobe resembled a hard shell. The *occipital* region was occupied by a prominent soft mass, red and fleshy on section; the bone was there defective. There were several similar outgrowths on the *left parietal bone*, with three on the *right parietal*. No other metastases. The microscope revealed a "congeries of saccules" as in the thyroid body; these were lined by cubical epithelium. Generally, each saccule contained a cavity occupied by gelatinous matter; but sometimes the new cell-growth completely filled that space. The *heart* was slightly hypertrophied.

A case by Wölfler is to be found in the *Archiv für Klin. Chirurgie*, xxiv., 1883. In Mr. Warrington Haward's case (*Path. Trans.*, xxxiii.), the patient was a woman of fifty-nine, who had suffered from an ordinary goitre for twenty years, the malignant disease having existed for one year. In addition to the thyroid tumour, metastases were found after death, in the *cranium*, *left scapula*, *left ilium*, and *seventh cervical vertebra*; also in *lungs*, *liver*, *spleen*, and *right kidney*. All the deposits consisted of reproductions of the thyroid tissue, with the exception of those in the lungs, which consisted entirely of "round-celled sarcoma." The other primary and secondary deposits

were very vascular; otherwise they "resembled to the naked eye, the tissue of an ordinary bronchocele." The pulse latterly was 150-160 per minute; at an earlier date, 120.*

II. *Cheloid*.

Definition.—A hypertrophic growth of scar-tissue; primarily benign, but apt to become sarcomatous.

The appellation "cheloid" was by Addison coined from *κηλιδ*, a scar; by Alibert, from *χηλη*, a crab's claw (NOT from *κηλη*, a tumour). It has been applied to three diseases, regarded as distinct from each other.

- (a) Addison's kelis, now called "circumscribed scleroderma."
- (b) The "cancroide" of Alibert.
- (c) The "cheloid" of cicatrices.

The two latter were formerly distinguished as "true" and "false" cheloid respectively. The confusion was not lessened by an occasional application of the adjective "true" to the malady first described by Addison. "Circumscribed scleroderma" pertains to the province of dermatology, and does not involve tumour-formation.

So far as can now be made out, the cases reported as "cancroide" by Alibert really arose in a minute cicatrix the existence

* Carcinoma of the ordinary type is in the thyroid body not very uncommon. Its metastases do not reproduce the special structure of that organ; but the parenchyma betrays a tendency to the mucoid degeneration. Round areas or cavities filled with fluid abound amid the parenchyma (Carcinoma myxomatodes). Extreme instances of this occurrence have been recorded as "colloid cancer."

As exemplifying the variety of malignant developments which beset the thyroid body, it may be pointed out that vol. xxxvii. of the *Path. Trans.* contains a case of ordinary carcinoma complicated with *myxœdema*, by Dr. G. Gulliver; a case of carcinoma, by Dr. Carrington; one of *spindle-sarcoma*, by Dr. Norman Moore; and one of *intra-cystic papillomata*, by Mr. Bilton Pollard. Dr. Gulliver's paper also alludes to an instance of malignant growth in association with sporadic cretinism. In vol. xxxvi. Mr. A. Bowlby records a very remarkable case in which a goitre presented under the microscope a structure *entirely fibrous*, yet had infiltrated the œsophagus, muscles, &c., exactly in the same manner as a carcinoma, causing death in about three years.

of which had been overlooked,* and therefore identical in nature with the disease here described. (See Report by Committee, *Clin. Soc. Trans.*, xiii.)

In its most common form, cheloid appears as a simple hypertrophy of scar-tissue. A cicatrix on the skin, after long-delayed union, gradually becomes thickened and elevated. Like an ordinary scar, it is either dull white or glossy and rosy-red, and it also retains the original shape of the lesion. Thus, as a cicatrix has little offshoots into the surrounding integument, so the new growth has similar claws, now much more pronounced—whence the name. Under the microscope the new growth is found to consist of firm and well-organised fibrous tissue, in no way differing from that of a healthy scar.

Such tumours are primarily benign, and if extirpated by the surgeon, do not reappear unless some portion of the scar thus affected has been left behind. Failing, however, the precaution of dissecting this latter away in its entirety, any minute residuum will probably undergo a similar development. For the formation of cheloid appears to depend, in part at least, upon some idiosyncrasy of the individual, and scars in divers parts of the body are liable to become thus affected in a person thus predisposed. Hence, cheloid is frequently multiple, and in the old flogging days soldiers or sailors were found with scores, or even with hundreds, of distinct cheloid tumours on their backs. Spontaneous resolution may very rarely occur.

With each successive surgical operation, however, a complete cure becomes somewhat more difficult to obtain, and the irritation caused by repeated ineffectual attempts at extirpation is apt in the end to engender actual malignancy. The fibrous-tissue development becomes more and more embryonic, and passes into a spindle-sarcoma, subsequently pursuing the same clinical career as other examples of that neoplasm. Even without the stimulus of such a procedure, however, cheloid is liable to become truly cancerous in the later years of life, under the combined influences of local traumatism and general age-reversion.

* Thus, in vol. xxxv., p. 338, of the *Path. Trans.*, is an account of the "true keloid of Alibert" on the front of the leg. But ten years previously a small warty growth on the spot had been treated by caustics and poultices.

In place of a general hypertrophy of the cicatrix with its "claws," the disease may present itself as a distinct outgrowth from some part only, then forming a firm sessile rounded tumour of shining rosy-red or pink hue, and of somewhat higher vascularity than the preceding—probably, also with a tendency to increase more rapidly, and with a somewhat greater proclivity to malignancy. The shining red appearance, though common, is not essential. When the scar happens to have been very small, the outgrowth from it may be covered by epidermis, and may resemble a simple fibrous tumour under the skin, its true cheloid nature being proved by the history of the case and by the concurrent presence of cicatricial tumours elsewhere. Thus, a middle-aged woman in the Cancer Hospital in November 1891, under the care of Mr. W. H. Elam, had a scar under the chin, an inch and a half long, elevated into a prominence of half an inch in thickness. From the lobe of each auricle depended a round, rather doughy-looking tumour, that on the right side being as large as an orange, on the left as a walnut. All the three had slowly grown since childhood; the ear-tumours had followed the usual piercing for earring purposes. After removal they were found to consist of well-organised fibrous tissue, with a thin covering of intégument.

In the cases examined by Virchow (*Die Krankhaften Geschwülste*, ii. 244), the new growth sometimes consisted of connective tissue, and was analogous to fibroma; in others, relationship to sarcoma was indicated by the exceedingly profuse cell-proliferation, with intractability, and great tendency to relapse.

When young persons are attacked, the early career of cheloid tumours is ordinarily one of slow and almost imperceptible increase. They are painless until there are manifest hyperæmia and tension; then pricking, dragging, uneasy sensations begin to be complained of, and subsequently merge into a condition of severe suffering. Most often the affection is subsequent to *traumatism*, as in the case of a burn, scald, or flogging; but occasionally it has resulted from *disease*, as boils, carbuncles, rupia. It has been known to follow a blister; lupus-scraping (Mr. Clutton, *Path. Trans.*, xxxiv.); the pitting of small-pox (Dr. Goodhart, *Clin. Soc. Trans.*, xiii.).

The scar-hypertrophy often begins in childhood, but may attack persons of any age and either sex. In the old, growth is more rapid and more liable to early cancer-development than in the young. The *sternal* region is a favourite locality: Alibert records six out of eight cases in the skin covering this bone; Rayer three out of five.

It is usually found that in the case of scars which have undergone the cheloid hypertrophy, the original wound was in some way subjected to irritation, and that there was long delay in healing.* Hence predilection for the place indicated.

III. *Kaposi's Disease (Xeroderma Pigmentosum).*

The very rare pathological condition which bears the name of Kaposi consists of a peculiar irritable quasi-inflammatory affection of the skin, which merges secondarily into epithelioma.

It first appears in children of the first or second year; when there are several in the family, more than one invariably suffers. Beyond this probable evidence of some inherited taint, no cause is assigned. The parts of the skin exposed to the air alone suffer.

In the first stage, numerous red blotches appear in profusion on the face, neck, and uncovered portions of the limbs. They soon fade, leaving a deposit of pigment; but the dusky areas continue gradually to increase in size and in number. Less commonly, there is a diffuse congestion of the integument, also succeeded by pigmentation; or, on the other hand, the first thing noticed may be abundant small freckles, which slowly enlarge. Some of the affected spots become indurated and hard; others atrophic. The whole skin is dry, harsh; it readily chaps, cracks, or develops an eczematous condition. It is often dotted with small nævoid tufts.†

In the second stage, after several years of the above, some of the pigmented patches *ulcerate*. The sores slowly heal; but are succeeded by others. They are scabby, and are accompanied

* Cases recorded by Mr. Cæsar Hawkins as "the warty tumour of cicatrices" (*Med.-Chirurg. Trans.*, xix.), were obviously examples of Epithelioma, and not of Cheloid, as proved by reference to the details.

† The pigment is stated not to be true pigment, but the result of blood-extravasation.

by warty outgrowths; they tend more and more towards the typical characters of epitheliomatous ulceration.

In the third, which is arrived at between the fourth and sixth years, the ulcers fungate, and infect the neighbouring lymph-glands. They become indistinguishable in macroscopic and microscopic characters from epithelioma. Death ensues, usually before the age of puberty.

There does not appear to be anything peculiar in the cancerous developments beyond their multiplicity, and the fact of their occurring at such an exceptionally early period of life. The epithelioma seems to be the natural result of an extreme susceptibility to irritation of all kinds.

IV. *Dühring's Neoplasm (Granuloma Fungoides).*

Red or dark-brown scaly patches, indistinguishable from those of chronic eczema, stud the skin for a period of years. Eventually multiple tumours, composed of "granulation tissue," grow from the patches; ulcerate, display the usual phenomena of cancer, and quickly terminate life. Occasionally, while some are developing, others disappear (as in other forms of disseminated cancer on the skin). Of the causes or pathology little is known; the disease would seem to be a form of sarcoma, consequent upon long-continued eczema. It is very rare.

V. *Multiple Polypi of the Skin.—Fibroma molluscum, or Molluscum fibrosum.*

Some of the cases thus described appear to be instances of disseminated sarcoma in the skin. The following was one for several years under the care of Dr. Marsden:

Hugh F. was admitted into the Cancer Hospital in 1887. He was thirty-eight years old, an auctioneer, intelligent, and of robust physique. In 1863, while a boy at school, he had "missed his kick" at football, and was laid up for a quarter from the effects of the strain: shortly after this injury, a tumour appeared in the abdominal wall; it was removed, but quickly recurred. By September 1887 ten operations had been performed by various surgeons, in addition to many months of caustic treatment by the notorious Paterson. A fungous mass, as large as a melon, then grew from the abdominal wall, above and slightly to the right of the umbilicus; the tissues at its base were deeply infiltrated, and a slough occupied the centre.

Scattered around were from twenty to thirty excrescences varying in size from that of a pea to an orange, non-ulcerated, soft, attached to the skin by a slender peduncle. Microscopical examination revealed the structure typical of spindle-sarcoma. The general health was not then appreciably affected, but soon afterwards broke down.

In well-marked cases, hundreds of soft fleshy polypi are scattered over the trunk and limbs; and the health is long maintained. In others, the primary tumour progressively enlarges; and originates but one or two secondary.

A woman, aged fifty-three, was admitted to the Cancer Hospital in May 1891, under the care of Mr. Jessett. Eight years previously, a pedunculated soft warty growth had appeared on the abdominal wall, a little above the iliac crest. It had remained stationary for four years; then slowly grew; was now a huge fungating mass, with livid base. Removed, it proved to be a spindle-celled sarcoma. Above the right iliac crest was a little grape-like polypus, consecutive to the preceding; this the patient stated to resemble exactly the primary lesion.

After a prolonged course, metastatic deposits of spindle-celled tissue occur in the viscera, and death results. The smaller "polypi" are whitish, soft, and flabby-looking; the larger are firm but never hard, often red or pink in colour; smooth and shining ulcers are apt to occur on the summits of the latter; their edges are raised and hard, with an excavated base; or fungous growth may take place.

Multiple polypi of the skin are said by Recklinghausen to be often coincident with multiple fibromata on the nerves (*Die Multiplen Fibroma der Haut*, 1882). Most elderly people have a few small pedunculated excrescences about the trunk and limbs, but these are of independent origin, not propagated from a single primary growth; and not to be confounded with the preceding.*

* In the *Brit. Med. Journal* of April 2, 1892, Mr. Marmaduke Sheild reports the case of an enormous dermatolytic tumour, consisting of fat and fibrous tissue, on the buttock of a woman, aged thirty-four; and associated with numberless polypoid growths (*molluscum fibrosum*) scattered over the body. Surgeon Major Lamprey (*ibid.*, January 23) figures a similar condition in a negro. The history of both is incomplete.

PART III.

A CURSORY ACCOUNT OF CANCER IN SPECIAL ORGANS, WITH ITS MOST APPROPRIATE TREATMENT.

CHAPTER I.

THE GENERAL PRINCIPLES OF CANCER TREATMENT, CURATIVE AND PALLIATIVE.

(a) *Curative.*

ALTHOUGH in no department of the medical art has the time-honoured maxim, *Populus vult decipi et decipiatur*, received more copious illustration than in that of cancer, although the slow halting course of some species and the obscurity involving the career of others have peculiarly favoured the pretensions of generation after generation of quacks, it is needless to state that this large class of diseases can be cured on one principle only, however varied the methods of its application. No means of procuring complete and permanent immunity has ever yet been devised which does not involve the direct destruction of the peccant cells which have undergone the cancer-process, together with that of the infective fragments of protoplasm transmitted from these to other portions of the body.

Although one internal remedy has a powerful influence in checking that "cell proliferation which constitutes cancer," yet none has hitherto been discovered which will utterly kill the cells. Setting aside those drugs which are employed on chemical principles, the remainder operate wholly by means of the natural laws which regulate the functions or the nutrition of the various tissues or organs. In cancer, according to the

only plausible theory of its development, we have to deal with cells which are emancipated from the control of the nerve-centres, and so are not governed or directly influenced by these laws. Hence, although internal medication will commonly effect a very great deal, will considerably retard the progress of the disease and materially prolong the individual's life, it cannot wholly arrest the malignant proliferation.

It might indeed be supposed that diffusible substances, not administered by the ordinary channels, but placed directly in contact with the diseased part, would be more effectual. But under the microscope a cancer is seen to consist of densely packed cells mingled with the *débris* of others which have previously died and have undergone decay, and with what yet remains of the healthy structures. The lymph-spaces, &c., are blocked up by the growing cells, the capillaries and smaller blood-vessels both in and around the mass are occluded partly by the same agency, partly by thrombotic plugs of fibrine crowded with leucocytes, and the mechanical difficulties of injecting a fluid medium into the core of the tissues involved amounts commonly to sheer impossibility. Short of an escharotic, no such agent can be brought directly to bear upon the cell-elements of the growth. So far, therefore, the treatment of cancer by hypodermic injections has furnished no better results than the preceding.*

A permanent eradication of cancerous disease on the above principle has hitherto been effected by means of two agencies only, the surgeon's knife and escharotics. The aim and net result of both is identical, and the question, Which in any given case is preferable? is a matter only of detail. Each has its special rôle, with relative advantages and demerits, to be pointed out later on. It is sufficient now to indicate that resort to the knife permits more free selection and judgment in the adaptation of means to ends, but involves possibilities of hæmorrhage, of shock, and of septic absorption from a raw surface, from which caustic applications are comparatively free.

* Under the unfortunate impetus of the "tuberculin" fiasco, a vast number of experiments in this direction were instituted—with uniform failure. For similar reasons to those advanced in the text, there does not appear to be any absorption by a cancerous *ulcerated surface*.

That, on the other hand, the latter *can* be of but limited and occasional use. The real CRUX of surgical cancer treatment lies, not in the primary lesion, but in the infective metastases, and these cannot be burnt away whether by chemical or mechanical escharotics, without extreme suffering and often most serious risk to life.

Among the considerations which should guide the operator in proceeding to remove from the body a cancerous growth are these :

Cancer is, *par excellence*, an infiltrating disease. The palpable tumour occupies but a small portion of the tissues pervaded by impalpable malignant cells or nuclei.

Certain structures are readily invaded ; and certain others long resist attack by the cell-army. The subcutaneous tissue, gland tissue, are examples of the former ; dense structures of the connective-series, tendons, ligaments, fasciæ, cartilage, scar-tissue, exemplify the latter.

Each individual case of cancer must be treated on its own merits ; with judicial appreciation of the variety, the organ concerned, and the particular state of that organ, tissues involved or likely to become so, age and habit of the patient, probable benefit from opium without operation, careful selection of each operative detail, &c.

Cancer proves usually fatal by means of the infective properties of its component cells. Often the primary growth contributes very little towards that result.

The infective particles are carried, in the most prevalent species, by the lymph-currents to the corresponding glands, where they develop into secondary tumours. Hence, in carcinoma and epithelioma it is of vital consequence to excise, whenever possible, all the lymph-glands in the infection path ; granted reason to believe that no further dissemination of the *materies morbi* has taken place.

It is necessary further to extirpate the adjoining lymph-glands, if possible, *before they have undergone any increase in bulk* ; by which time the particles will have been still further diffused by the lymph or blood-currents ; and in the carcinomata general blood-infection will have commonly taken place.

Cancers of the connective-tissue series do not invade the

neighbouring lymph-glands by means of the currents of lymph; and this precautionary removal of the latter structures is not indicated in the (true) sarcomatous diseases.

Whenever there is deposit in remote lymph-glands, or in the bone-marrow, or when there is any reason to believe that the infectious particles have already reached the current of the circulation, no operative treatment can have more than a palliative aim.

For every surgeon who is called on to perform an operation for cancer it should be a maxim that *with such a measure the proper treatment of the case is only commencing.*

(b) *Palliative.*

Cancer is always an inflammatory or quasi-inflammatory disease. The malignant cells seem to act exactly as would a foreign body inserted into the healthy tissue. The afferent blood-vessels dilate; a greater quantity of blood, from the earliest inception of the cancer process, flows to the part, and progressively increases; an army of leucocytes invades all the tissues bordering the implicated tract. Hence, to incise tissue infiltrated by cancer-elements of necessity involves an aggravation of the inflammatory phenomena, and results in more rapid cell-growth. Operations which can possibly succeed in destroying but a portion of any cancerous tumour are therefore tabooed by every judicious surgeon, as doing infinitely more harm than good.

Further, when secondary deposits, impossible of eradication, also exist, it is generally of doubtful benefit to excise the primary tumour, even completely and permanently. For although there have been no direct irritation of growing cancer parenchyma, yet the worry of an operation, heightened temperature, and other concomitants of the healing process, similarly combine to stimulate more rapid progress of the metastases. Hence, it is generally best to decline operative interference in these circumstances also.

To the above wholesome rules there exist, however, certain conditions of exception. To burn away, by means of the actual cautery, a malignant tumour, even to only a partial

extent, does not involve the same ill consequences as do incisions into the mass. The cells do not proliferate more quickly; but, on the contrary, their growth is often materially checked. If a "fungous protuberance" be cut away, the remainder sprouts forth with accelerated vigour; if the same be burnt, an excavated ulcer results, which may even in great part cicatrise over. Hence, if it be found necessary to interfere surgically with a cancer which cannot be wholly excised, a burning instrument is very greatly to be preferred to the knife.

Under conditions tending rapidly to death or productive of severe suffering, repeated attacks of hæmorrhage, exhausting and fœtid discharges, interference with normal functions, &c., it is often absolutely necessary to remove as much as possible of a cancerous mass. The use of the actual cautery (in the form of the galvanic snare, or the thermo-cautery of Paquelin) for this purpose enables the operation to be conducted without shock and without loss of blood, besides leaving the absorbents sealed by a hard, dry eschar, which precludes septic absorption. After separation of the latter, the wound usually heals readily with a tenacious cicatrix, unfavourable to subsequent cancer-growth.

The two palliative operations most prominently indicated on the above grounds, and productive of the most benefit, are:

- (a) Excision of the tongue.
- (b) Removal of the adjoining lymph-glands in cases of breast carcinoma.

In cancer of the tongue the suffering involved by such disease allowed to run its course without surgical interference is so intense, and the impediment to nutrition so serious, that whenever it is safe to submit the patient to anæsthesia, a palliative excision by the methods above is almost imperatively demanded. And in mammary carcinoma removal of the contents of the adjacent axilla serves not only to check considerably the progress of the malady, but precludes the super-vention of that very painful symptom, "brawny œdema of the arm."

Whenever it is possible to surgically remove so much of a primary cancerous growth as will permit cicatrization of the wound, the inhibitory influence of the scar-tissue upon re-

appearing cancer-nodules becomes apparent. When firm union has taken place after an excision of the mamma, for example, any "recurrent" nodules on the site are atrophic, of very slow growth, long devoid of symptoms, often escaping notice for several years.

The practice of *scraping* malignant sores has evidently been copied from the methods found useful in lupus, a disease which presents no analogy to cancer. In cases of the latter, the plan temporarily cleanses the surface, but is necessarily followed by more rapid cell-growth. It would seem to have been generally resorted to for malignant lesions of the uterine cervix, where the subsequent ill-consequences are somewhat hidden from view. The adoption of this method to a cancerous ulcer, wherever situate, is never permissible, unless when followed up immediately by free cauterisation of the raw surface, and even then it is preferable to employ the cautery alone. Under any other circumstances it is emphatically to be deprecated; and with lymph-gland metastases, the real danger of infective carcinoma, they cannot be invoked at all.

Chemical escharotic applications have long been the special stronghold of unlicensed practitioners. Their number is ostensibly legion; on investigation they become reduced to a comparatively few substances, variously blended or disguised. Whatever the active agent, caustics are of use only for small localised areas of cancerous disease, as in the chronic epitheliomata of the face. Applied to large or deeply seated masses, they do infinitely more harm than good.

For practical purposes the long list of caustics may be conveniently reduced to three: Potassa Fusa, Iron Perchloride, Strong Sulphuric Acid.

The stick *Potassa Fusa* is the most generally serviceable. It acts rapidly and energetically by means of its affinity for the water of the tissues; by the operation of the same chemical law its effects can be easily controlled. Hence the surgeon

* A tolerably complete list of the caustics then or previously in vogue will be found in Velpeau's *Treatise on Cancer of the Breast*, 1856. A discussion of their proper sphere of usefulness occurs in my lecture, "The Non-Operative Treatment of Cancer, its Scope and Necessary Limitations," *Prov. Med. Journ.*, April 1891.

has in this salt a weapon which will readily obey his hand. Directly water is freely applied to the tissues which are being destroyed, all further action, together with all that pain which resort to any escharotic necessarily involves, cease instantly.

The crystallised *Iron Perchloride* is efficient for one cancer-variety only: Cauliflower Excrescence (Papilloma) of the Cervix Uteri (*q.v.*). The strong *Oil of Vitriol* is potent, but dangerous, in consequence of the difficulty in restraining its action within the required limits. It has been employed mixed with various vehicles, as asbestos (the notorious Michel's paste), charcoal, saffron (Velpeau), and lycopodium. It may be legitimately resorted to in order to destroy a vascular fungous mass on a flat surface. On a curved there is considerable risk of the acid trickling down and burning healthy tissues; as good an effect will be attained with far less danger by other means.

Two efficient escharotics, still occasionally resorted to, should be discarded for the following reasons: *Zinc chloride*, because its application in any form involves severe and uncontrollable pain, often amounting to agony, for many hours afterwards. *Arsenious acid* in mucilage or others, because it may become absorbed in dangerous quantity, especially if near mucous membrane.

Nitrate of silver acts very superficially; its employment often causes epithelioma, never succeeds in eradicating this when pre-existent.

Acid nitrate of mercury, chromic and acetic acids, are also but superficial and painful irritants, more likely to do harm than good.

Of many now obsolete "instruments of torture" for the unhappy victims of cancer the following may be mentioned: The "Vienna paste" was a compound of caustic potash and quicklime, in nearly equal parts; before use, it was moistened with alcohol. Manec's paste consisted of arsenious acid 15 parts, cinnabar 75, burnt sponge 35. Canquoin's of zinc-chloride mixed with 3 or 4 parts of flour; Bougard's, one of the most recent, of arsenic, cinnabar, corrosive sublimate, solution of zinc chloride, sal-ammoniac, wheat-flour, and starch! Among other agents of this class which from time to time have been employed are, bromine, terchloride of antimony, chloride of gold, nitric and hydrochloric acids.

The "cancer cures" which, according to newspaper paragraphs, are discovered from time to time in various parts of the world, generally prove to be mild escharotics of vegetable origin, principally the acrid juice of plants belonging to the *Euphorbiaceæ*.

Another favourite quack remedy for cancer is electricity in various guises. Inserted into the tissues, each of the electrolytic

needles sets up a local chemical action, resulting in the production of a slough. Thus each acts as a cautery on a restricted scale; the cell-growth, without the part directly burnt, is in no way influenced by the electric current; when the latter is passed through the mass without the introduction of needles, the effect is similarly *nil*. *The electric current modifies function, but has* (with the above reservation) *no appreciable influence upon nutrition*; neither checking nor accelerating cell-growth. Since the days of Mesmer innumerable attempts have been made to bring this powerful force to bear upon the course of cancer, with unvarying failure.

Of all therapeutic treatment in the case of cancerous maladies, the sheet-anchor is Opium.

The extraordinary powers of this "gift of the gods" in sustaining life and energy under conditions of extreme exertion, combined with the deprivation of food, has been copiously pointed out in many publications, lay and medical. From its value in health may be naturally inferred its effects in almost any exhausting disease, whereof cancer is one of the most typical. Moreover, upon malignant lesions the continued administration of opium or of its derivative, morphia, appears to exert a direct and conspicuous retardative action; materially checking the cell-growth, in both primary tumour and in its secondary metastases. Thus in mammary new growths, taken as the most open to observation, we find an "atrophic" condition often brought about by the early and persistent administration of these medicines. The breast-tumour commonly diminishes in size, shrivels, refuses to ulcerate, progresses either not at all or at a very slow rate. The metastatic deposits, if present, long remain stationary. Not only is the patient's mental comfort enhanced, pain obviated, the vital powers sustained, several years of fairly enjoyable life thus procured; but there is an improvement in the objective phenomena, which can be attained by no other possible method of treatment. Tonics are but *placebos*; neither sustaining strength, nor checking the ravages of the disease.*

* For details of a case in which, under most unfavourable conditions, life was thus prolonged several years, and multiple skin-nodules underwent absorption, see *Palliative Treatment of Incurable Cancer*, p. 31. The same lecture discusses the principles of opium-administration; and recommends the opium-pipe as a suitable vehicle under many circumstances.

Whenever the perfect eradication of a cancerous growth is hopeless, treatment by small, gradually increased doses of opium or morphia should be immediately instituted, and steadily persisted in until the close; *this, with the object of holding the disease directly in check*, and not merely of alleviating symptoms. To withhold opium from the unfortunate sufferer until pain necessitates its use, is a barbarity which cannot be too emphatically condemned. After any operation, which will probably be followed by re-appearance, it is expedient to promptly induce an opium or morphia habit. *Belladonna* and *antipyrine* will enhance the *anodyne* effects of these; and *curaine hydrochlorate* is of use as a local anesthetic when pain is caused by the friction of two opposed surfaces. Various agents of topical value will be referred to in subsequent chapters.

Together with the above should always be conjoined the aim of procuring for cancerous patients the utmost passivity of body and of mind; of reducing them to a vegetative, plant-like condition; of conferring upon them a tranquil yet not unpleasurable "Nirvana." In proportion to the early date at which treatment on these principles can be instituted, will its good results become apparent.

CHAPTER II.

GENERAL CONSIDERATIONS ON DIAGNOSIS.

IN all cancerous disease, the ideal of curative treatment has been shown to be the capacity of destroying or removing all the cells or cell-particles before time has permitted the transmission to other parts of metastatic cell-fragments. Hence the vital importance of early diagnosis in the case of cancerous growths admitting resort to the methods of surgery. There is seldom difficulty in securing that aim, partly on direct grounds, but still more by reference to *à priori* considerations, by bearing in mind the conditions under which the development of cancer may be anticipated.

Before discussing these points, it is necessary to reiterate that between the two great classes of tumour-formations, the Benign and the Cancerous, there exists no rigid and unvarying line of demarcation. Between typical examples of each lies a wide clinical and pathological gulf; but there is also an intermediate debatable land; and tumours exhibiting every gradation of structure between the typically benign and the typically malignant are met with.

Examples of this assertion have been adduced in the preceding pages; chiefly in connection with neoplasms of the connective-tissue series, but also of other new growths. Some connective-tissue tumours pass into a malignant phase only in the rarest possible instances—*e.g.*, those consisting of fat or of bone. Others much more commonly thus destroy life, after a long term of years; such are the cartilaginous outgrowths, or those composed of mingled cartilage and bone. And others almost always eventually display malignant phenomena; as

cheloid. Simple overgrowths of white fibrous tissue (fibroma) occasionally pass into the spindle-sarcoma; tumours of non-striated muscle (myoma) not infrequently develop malignancy; mammary cysts appear *always* to do so in the end.*

In the rather exceptional event of this pathological transmutation some obscurity must necessarily envelop the real nature of the lesion before its removal by the surgeon. Even subsequently, implicit reliance cannot be placed on the results of a microscopic examination. A small and insignificant part of the tumour may alone have developed malignancy; the remainder consisting of well-organised tissue with no cancerous feature whatever. The microscope can be relied upon for positive proof of the existence of a cancer-process; but not for the negative of its absence. Hence, in any doubtful case, *à priori* probabilities and clinical evidence far outweigh the evidence afforded by the microscope. The melancholy example of the late German Emperor sufficiently exemplifies this.

Of general considerations aiding the diagnosis of malignancy, the following may be pointed out:—Whenever a tumour is discovered, the most significant element in pointing to its real nature is the AGE of the individual. With the exception of a small group of obscure and ill-understood diseases, in which there seems to be a congenital element, cancer of every species is emphatically a disease of advanced middle or old age. Every tumour which appears in the breast of a woman, aged thirty-eight or upwards, is an actual or potential cancer. After that epoch the connective-tissues rarely undergo simple hypertrophy, or develop any species of tumour but the malignant. Enlarged lymph-glands in the aged, unless due to an evident septic cause, rarely prove to be otherwise than cancerous. Previously to middle age, which may be regarded as beginning on the average some five years earlier in the female than in the male, the probabilities are very largely in favour of the benign nature of any tumour then appearing. At or subsequently to the arrival of that epoch, they immensely preponderate in the direction of cancer.

Next in importance comes the question of CAUSATION. For benign tumour formations, for the most part redundant over-

* See cases quoted in *The Reappearance of Cancer*, Appendices B and C.

growths of normal tissue, no *rationale* in the conditions of the environment, or in the operation of force acting from without the organism, can usually be found. Sometimes they seem to follow an injury; more often they appear to be the result of some derangement of nutrition by agencies within the body. On the other hand, no cancerous disease (with the exception of the small congenital group above referred to) ever becomes developed without the previous operation of a direct exciting cause, varying in character with the particular class of cell concerned (p. 31 *et seq.*). Hence, on the history of the immediate antecedents in any particular instance must largely hinge the diagnosis.

With this must be regarded the relative liability of organs or localities to malignant disease; the proclivity of males to cancer in the buccal tract, of females to malignancy in their special sexual organs, the tendency of cancer to appear in organs undergoing devolutionary changes, &c.

Pain is a symptom of varying diagnostic importance, being unfortunately absent in some of the most prevalent forms until far advanced, or only felt in a minor degree. In the early stages of those cancerous growths which begin as deeply seated solid masses, there is little or no complaint of pain until the advancing tumour involves TENSION in its investing fibrous structures. Later, severe pain is produced by *pressure on sensory nerves*, irritation of these by *septic* and *degenerative processes*, with the *local inflammation* resulting from the latter.

In species which are *ab initio* ulcers, pain is a constant and useful indication of malignancy. A history of *prolonged depression of the vital powers*, from *worry*, *anxiety*, *severe illness*, *over-strain*, *bodily or mental*, &c., can never be disregarded as an element in diagnosis. Nor in a tumour, probably of connective-tissue origin, can an account of previous *injury* or *sprain*. Any such immediately following a blow or fall, and *rapidly progressive*, rarely proves to be otherwise than malignant.

An ulcer which readily bleeds when lightly touched is almost certainly cancerous. Attacks of hæmorrhage from the female genitals, after the climacteric, are but seldom due to other sources; and even before the menopause, should always suggest prompt elucidation of the cause. That *hyperæmia*, which is

one of the most invariable concomitants of cancer in any shape, in superficial lesions, quickly displays its presence; in those which are more deeply seated, not till a later stage.

Conspicuous emaciation and rapidly progressing failure in general health are early signs of malignant disease in visceral organs. They may long precede the discovery of a tumour.

Enlargement of lymph-glands in the track of lymphatic vessels leading from the part affected, is necessarily significant in the case of those lesions which tend to infect those organs. But this is a physical sign of relatively late occurrence; and the cancer should be recognised before its supervention.

The infective nature of the new cells indicates that whenever *à priori* reasons combine with local phenomena in such a manner as to suggest the presence of malignancy, an exploratory incision should be resorted to without delay, whenever the case admits of surgical treatment.

CHAPTER III.

CANCER OF THE BREAST.

Species.—*Carcinoma*, derived from the epitheloid cells of the acini or of the ducts, is the most prevalent variety. It is generally chronic (*Scirrhus*); less often acute (*Encephaloid*); between these two extremes are many intermediate grades.

Spindle-celled sarcoma is much less frequently met with. *Lympho-carcinoma* may attack the axillary lymph-glands, and thence secondarily invade the mamma. I have never encountered a growth consisting solely of round or ovoid cells, which was not directly traceable either to this source, or to the glandular epithelium. Degeneration-forms (*colloid*, *myxoma*) are exceptional. In spite of the areolar pigmentation, I know of no example of melanotic cancer in women; although Gross (*Dis. of Mammary Gland*, p. 238) alludes, on other authority than his own, to two in males. Rare tumour-formations, containing cartilage or bone, are probably of vestigial origin (*blastoma*).

Sex.—*Carcinoma* is almost wholly restricted to women. Sir J. Paget (*Surgical Pathology*) somewhat hesitatingly credits males with a relative liability of 2 per cent.; he had seen four cases. Gross (*op. cit.* p. 238) had met with two in men, against one hundred in women. During the past sixteen years only two male cases have occurred in my own practice.

Causes.—The most common source of carcinoma is *mental distress*, *worry*, or *anxiety*, occurring when the organ has passed its period of functional activity, and is undergoing involution. The influence of laborious and harassing occupations—such as those of washerwomen, monthly nurses, sempstresses—is con-

spicuous among the poor. Laundresses are specially liable. Many hospital patients prove to be widows who have been compelled incessantly to toil in support of a family; others have been the victims of a drunken husband, or have been deserted. Cases in both poor and rich not seldom date from an attack of any severe illness (pneumonia, influenza). For examples of such *neurotic* antecedents, see *The Reappearance of Cancer*, Appendix A.

Sudden injury accounts for only 11 per cent. (11.7 Gross) of mammary carcinomata. *Continuous irritation*, as from stays pressing on the nipple, syphilitic ulceration, bad habits associated with the same structure, or the rare Paget's disease, prove the source of nearly an equal number. Many such cases give a history of depressing emotions in addition.

True sarcomata may arise within the stroma, from *sudden violence* or *muscular strain*; they often commence within cysts, constituting the less prevalent species of intra-cystic vegetation (p. 110).

All forms of tumour within the breast-tissue act during the involution-period as causes of cancer, and eventually display malignant features.

The "Fibroma of Adolescence" is a local hypertrophic induration of the breast-tissue, met with in the mammæ of young girls during the period of development, and very common among civilised communities. In the least conspicuous form, an ill-defined hardness is felt in some portion of the parenchyma; in the more marked, there is a distinct tumour, a small rounded "kernel," less hard than an incipient scirrhus, but otherwise scarcely distinguishable by the touch alone from the latter; only in exceptional instances is a tumour of larger bulk than a small walnut met with.

Like the analogous Uterine Myoma, these growths are often multiple, both breasts being affected. They are accompanied by sensations of uneasiness, and are tender on pressure at the menstrual periods; are not productive of appreciable pain, unless the patient is either highly neurotic or indulges immoderately in tea. They do not increase in size; often disappear entirely under appropriate treatment (repeated inunctions with an ointment composed of *iodide of lead* and *lanoline* has proved the most effectual remedy in my own experience); if left alone, will vanish in later life, or when the organ becomes subject to the stimulus of pregnancy. These, with the corresponding uterine tumour, appear to be confined to civilised woman, in whom they are mechanically produced by the

pernicious *corset*, preventing the normal evolution of the organs affected. The breast-fibromata of young girls differ from the neoplasms, next to be considered, in not exhibiting tendency to cyst-formation, and in bearing no appreciable relationship to cancer. Microscopically, they consist of abundant white fibrous tissue, enclosing scanty acini. They rarely persist until the cancer-age, even if "severely left alone," and do not require any operative treatment.

Per contra, the "Adeno-Fibroma," or "Cystic Fibroma" (Plate XIV.), arises after the age of thirty-five, when the involution of the mammae has commenced. The tumours are solitary, progressively but very slowly grow to a large size, are painless and in themselves harmless; but eventually become associated with malignant disease. The enormously hypertrophied stroma encloses acini, whereof the epithelioid cells undergo mucoid degeneration. Hence, an invariable tendency to cyst-formation; sometimes the cysts are large, sometimes only microscopic. A thin section always presents a cribriform appearance; the numerous minute perforations (cysts in embryo) are seen to contain traces of the gland-cells formerly present. Often there is within each a persistent lining of columnar epithelium, with bridges of the same traversing the lumen of the cavity, and with small heaps of roundish or ovoid parenchyma here and there adhering to its wall.

The "Cystic Fibroma" of middle-age (of which "Adeno-Fibromata" are but an early stage) may eventually undergo conversion into a congeries of cysts, with little intervening solid material. From the wall, in time, sprout "Intra-Cystic Vegetations," sarcomatous or carcinomatous. More often, however, the cells of the included alveoli invade the surrounding tissue; and an ordinary scirrhus carcinoma results.

Removed in the pre-cancerous stage, with due precaution, these growths have no tendency to re-appear. When a carcinoma-process has commenced, the axillary lymph-glands become infected, and the case progresses as a scirrhus of the ordinary type. For examples, see Appendix C in *The Re-appearance of Cancer*.

During the involution-period of the female mamma, which lasts from the age of thirty-four until the end of life, all abnormal "lumps" which occur amid the glandular parenchyma will assuredly develop malignant phenomena, in one form or other, sooner or later. Such hinder the natural involution-process; when middle-age has been attained, even the simplest cyst, whether a dilated duct or a dilated acinus, or even a dilated lymph-space, is thus a potential cancer. See nine cases in Appendix B, *Re-appearance of Cancer*: the duration in a quiescent stage of the antecedent cyst was in three of these, forty-two, twenty-one, and twenty years respectively. The *Path. Trans.*, xxii., contains another example: the patient was fifty-eight years old, and had possessed a quiescent breast-tumour for thirty-six years.

It remains to point out that interference with the nutrition of

the mammæ by stays, commenced in youth, often to my knowledge imposed in a very aggravated form by imprudent mothers on their offspring at the age of eight or nine, must of necessity prepare the soil for cancer, a disease specially attacking parts with depressed nutrition, in later life. Also, that malignancy is but one of several forms in which aberrations of the involution-process primarily manifest themselves. Messrs. Cecil Beadles, Johnson, and Stiles have described pre-cancerous changes in connection with carcinoma. Associated with another tumour-species, and as, moreover, indicating the influence of mental emotion, I would refer to a case in which I lately excised the large and well-developed breast of a lady, aged fifty. A typical adeno-fibroma occupied the upper part, in size that of a hen's egg. The whole remaining portion of the gland-parenchyma, beyond the actual tumour, was found in a state of irritation to which I have never seen a parallel except in direct association with cancer. It was hard, vascular, everywhere adherent to the skin-covering, and extremely difficult to dissect out; a portion adhering to the pectoral muscle. The only ascertainable cause was an abnormally excitable and passionate disposition; whereof a convincing proof was afforded by the invalid attempting for some trivial cause to push her nurse downstairs, twelve days after the operation.

For a very exceptional instance of a "Fibroma of Adolescence," lasting from girlhood, and becoming secondarily implicated by adjoining scirrhus deposit, at the age of forty-four, see *Path. Trans.*, xxxix. 319 (Mr. J. Hutchinson, jun.). Two others, respectively by the same surgeon and Mr. Rushton Parker, are reported in vol. xxxii.

Age.—For malignant mammary disease in woman, the special cancer-age is from thirty-eight years onwards, corresponding to the involution-period of the gland (which may, exceptionally, commence a few years earlier). Unless the date of inception can be fixed by the receipt of some mechanical injury, statistics must be received with some caution; owing to the insidious primary developments, and for other reasons, women almost invariably underrate the duration of their malady. Of 153 cases by Mr. Sibley (*Med.-Chir. Trans.*, xlii.), 31 are assigned to the age of 30–40; 58 to that of 40–50; 40 to 50–60. The oldest was 84, the youngest 26; the average was 48.6 years.

Marriage.—Of 260 cases by Mr. Marrant Baker (*ibid.* xlv.), 72.4 per cent. occurred in the married, 4.6 in widows, 23 only in single women.

Implication of the Opposite Breast.—Of 61 cases (Sibley), the opposite mamma was infected in 9 = 14.7 per cent. The

condition, unless well marked, may escape observation. (See p. 91.)

Symptoms and Course.—The mode of inception and ordinary clinical phenomena of chronic carcinoma are detailed at p. 82 *et seq.*: those of the acute variety at p. 103.

Sarcomata, &c.—Spindle-celled Sarcomata, not associated with a pre-existing cyst, are far less frequently found in the breast than carcinoma. With the latter, however, they may be readily confounded, failing a microscopic examination. They rapidly progress with the usual indications of malignancy, ulcerate, and prove fatal. The axillary glands are not implicated, except by direct invasion. These organs may, however, undergo some degree of irritative enlargement without actual deposit; and secondary nodules in the muscle-substance may be mistaken for glands (see case, p. 139). The characteristic lancinating pains of scirrhus, with their intervals of ease, are wanting; but there is a progressively severe continuous ache. There is a history of contusion, or else of violent exertion.

When Lympho-carcinoma is developed in the axillary glands, the breast-tissue may become secondarily involved by contiguity. The disease follows over-strain. These organs painlessly enlarge, then either the skin becomes adherent, and breaks down with the development of a bleeding "fungous protuberance"; or when the deeper glands are first attacked, we find a knotty mass of nodular tumours, not hard, or at first appreciably painful, but which speedily lead to a similar condition in the glands of distant parts, neck, groins, opposite axilla, &c. Mammary tumours, consisting of round-cells ("round-celled sarcoma"), are sometimes referable to this class; most commonly, however, they prove to be derived from the acinar epithelium (Encephaloid Carcinoma). Cases of the "colloid" degeneration may not differ in any clinical particular from ordinary scirrhus; on the other hand, the best-marked examples display remarkable chronicity.

The tendency of cysts within the gland-tissue to become a source of malignant disease has been above pointed out.* The most common mode in which the association occurs is by the

* Sub-cutaneous cysts, usually sebaceous, are of course excepted.

development of Intra-Cystic Vegetations (p. 110), which may be either carcinomatous or may consist of new connective-tissue. The supervention of malignancy in an old-standing cyst causes severe pain, due to the increased tension, and generally involves a prompt appeal for surgical aid.

Should, however, the disease have been allowed to proceed further, we see a condition now rarely met with—the “Fungating Adenoid” of the older writers. The cyst pushes before it the integument, and both eventually ulcerate. A rapidly growing mass of very vascular exuberant granulations quickly protrudes, attended by profuse serous discharges and frequent attacks of hæmorrhage. This attains a large bulk, and unless extirpated, quickly destroys life by excessive drain of blood-constituents. To the last the disease is localised, and patients in an extremely exhausted condition recover permanent health after operative removal. The condition was relatively frequent in pre-anæsthetic days.

It is seldom possible to distinguish between intra-cystic, carcinomatous, and sarcomatous developments, until a microscopic examination becomes possible. A small “lump” has existed in the breast without giving trouble for a period of years, until the patient has reached middle-age; if near the nipple, there will be a history of occasional straw-coloured discharge from that structure, spontaneous or after slight pressure. The patient receives a blow, or undergoes severe trouble. Then quickly follows a sudden and rapidly progressive enlargement. The tumour becomes acutely painful, and the surrounding tissues become hyperæmic. Suffering is in the first place due to simple increase in the fluid contents, from determination of blood. It is quickly aggravated by the additional pressure of vegetations sprouting from various parts of the cyst-wall.

Later, when the vegetations are numerous and the cyst-wall tenacious, complete absorption of the fluid may ensue. A “capsule” is then formed, entirely filled by dendritic masses of fibrous consistence. These consist of spindle-celled tissue, some well organised, some embryonic. Each is coated by epithelium, usually columnar in shape. The cyst has now practically become a solid tumour. Cases of this occurrence have been reported as “Villous Cancer.”

A similar change may be found at one stage of carcinomatous vegetations ("Duct-Cancer"), but is then necessarily more transient.

Breast-cysts, in the majority of instances, are simple dilations of a lactiferous duct, consequent upon some mechanical obstruction. They are most commonly found therefore in close proximity to the nipple, and the oblong shape of the small fluctuating tumour sufficiently indicates this origin. In a considerable proportion, however, of cases, they arise, not in the ducts, but in the acini themselves, whereof the epitheloid cells seem to undergo a mucoid degeneration, and to break down into fluid. Instead of being carried away, like tissue-excreta in general, by the lymph-currents, this is retained and becomes encysted. The condition may affect but a single acinus; on the other hand, there may be a general tendency to cystic degeneration throughout the entire organ. In an early stage of this the parenchyma is studded throughout by minute cysts, little larger than a pin's head. Later, one or two of these enlarge, the remainder continuing stationary. Or the whole breast may become a congeries of cysts, the gland-tissue having disappeared. Both *mammæ* may be affected simultaneously or successively.

Much more rarely, dilated lymphatics or lymph-spaces, hydatids, angiomas, are found to have been the source of cyst-formation.

The fluid contents of cysts which have developed internal vegetations, particularly those of the carcinoma species, are augmented by hæmorrhage and by the exudation of blood-serum from their then vascular walls. The liquid is variously tinged by hæmatine; within large cysts a quantity of more or less degenerate blood-clot is commonly present.

Apart from direct cancer-growth from the cyst-wall, cysts become associated with malignant diseases of the breast in various other modes. Scirrhus or even encephaloid carcinoma may originate in the cells of gland-acini included in the thick cyst-wall of a long-standing cyst, or bordering immediately thereon. The latter thus becomes eventually enveloped by carcinomatous parenchyma.

This sequence, again, is often reversed, and a slowly growin

carcinoma or sarcoma, by mechanically obstructing ducts or lymph-channels, secondarily produces a cyst. In very chronic forms of malignant disease, cysts may result from mucoid degeneration of the cell-growth. (See Appendix B.)

Carcinoma of the Male Breast.

This comparatively uncommon disease follows *mechanical injury*, blows, scratching, &c. Whether neurotic cases will alone produce it, is extremely doubtful. It is always chronic, resembling "atrophic" cases of scirrhus in the female mamma; there is hardly ever any "fungous" protuberance; there is little tendency to ulceration, and the sore thus formed readily cicatrises. The characteristic lancinating pain is felt; the axillary lymph-glands are implicated early. No infection of the marrow is known to take place, but the subcutaneous tissue eventually becomes the seat of multiple nodular deposits, and by this track the opposite breast is affected. For table of 61 cases by Mr. Wagstaffe, see *Path. Trans.*, xxvii.

Variations in Course, or in Mode of Inception.

When scirrhus carcinoma arises from NEUROTIC causes, it necessarily commences more insidiously than when due to mechanical violence. Very often it is found out only by accident; the patient with a large mamma notices a tumour only when this has already attained large bulk. For this, and also partly for reasons of half-involuntary self deception, women are prone to under-estimate very considerably the duration of their malady. In order to gauge accurately the first inception of the cancer with its rate of progress, it is needful to ascertain the date of the precedent calamity, illness, or trouble, whenever that may have presented itself in sufficiently striking form. This can be more easily done among the comparatively affluent than among the poor; but even with the average toil and careworn hospital patient, the death of a husband, child, or other near relation, often serves to fix the duration period very precisely. I have met with several cases following severe attacks of the recent influenza. The most seemingly trivial

incidents of recent personal history are often of value for the practical purpose in question. Given an anxious, worrying disposition, very little may serve to throw out of gear the normal involution processes of the female breast.

When deeply seated in a huge fleshy mamma, a rounded tumour is felt on palpation. Its hardness is obscured by the fat, and unless large, it can only be differentiated from the healthy parenchyma by careful bi-manual examination; the breast being supported with one hand, and the other passed gently over the upper surface. It is freely movable, aches after examination, but otherwise long remains painless. The symptoms already described gradually supervene.

A progressive *retraction of the nipple* may be the first indication of cancer, and may be at first associated with no palpable tumour. This takes place when carcinoma begins in the cells of the lactiferous ducts. The symptom takes place at a later stage, whenever these ducts are implicated by chronic carcinoma, but not otherwise. It is therefore not an invariable concomitant of cancer.

Carcinoma commencing amid the lactiferous ducts at the root of the nipple is restrained in its advance by the fibrous tissue of that appendage. The cases progress gradually, but slowly implicate the gland parenchyma, and admit of beneficial operative treatment, even when ulceration is extensive. The microscopic appearances presented by such a lesion are those of ordinary scirrhus; they conspicuously differ from those of the carcinomatous intra-cystic vegetations erroneously designated "Duct Cancer."

"Atrophic" cases occur in women with small, ill-developed, or atrophied breast, approaching the masculine type. They are marked by extreme chronicity of clinical course and by proportionate mildness in the malignant symptoms. The tumour is to the last small, withered, and hard; with the surrounding integument puckered, drawn in, and wrinkled. There are hardly any inflammatory phenomena, any undue vascularity of the surface-tissues, any evidence of softening. Ulceration is either absent or does not pass beyond a shallow erosion, which with due care again heals over. The axillary lymph-glands enlarge, but tardily. There are not usually

"rheumatic pains" in the loins and bones, and none of the physical signs of marrow-infection. Metastatic deposits within the mediastinal lymph-glands, lungs, or liver, follow after the lapse of many years, and ultimately prove fatal. It is no uncommon event, however, to meet patients with "atrophic" scirrhus growths of twenty or thirty years' duration, whose general health is hardly at all impaired. Such cases help to swell the huge gains of quacks and of patent medicine vendors.

A strip of gland-tissue is in a certain number of women prolonged around the edge of the *pectoralis major* muscle into the axillary cavity, and is equally liable with the remainder of the mammary parenchyma to scirrhus. The cancer now seems to begin within the axilla; it betrays, however, its origin by the characteristic induration and contraction, and is easily differentiated from primary malignant disease of the lymph-glands (lympho-carcinoma) which sometimes attacks the latter organs. The axillary glands are secondarily invaded with great rapidity, and then blend with the primary in a single mass.

Lymph-gland infection, as betrayed by enlargement, is a very early physical sign in the great majority of cases. Usually the nearer the primary scirrhus is to the axillary cavity the more quickly does it occur. In "atrophic" cases, it may not, however, appear till after many years. In rare cases, a scirrhus growth, at the extreme upper limit of the mamma, produces enlargement of the supra-clavicular glands by way of the lymphatics passing over the clavicle.

All the phenomena of scirrhus are enormously exacerbated by pregnancy, whether antecedent or subsequent.

In stout females, a "puffy tumour" above the clavicle, on the side of the disease, is a late symptom in carcinoma. A seemingly analogous condition prevails bilaterally in cretins. In the site indicated, an ill-defined soft prominence, about the size of a pigeon's egg, makes its appearance, and closely simulates a lipoma. It is perfectly painless; underneath may be felt the supra-clavicular lymph-glands, of normal size or only slightly enlarged. These subsequently increase in bulk, the soft swelling becoming supplanted by a hard knotty mass.

Obstruction to the current of lymph, which should normally traverse the lymph-glands, results from cancer-deposit therein. Hence follows dilatation of the lymphatics in the rear of the impediment, with a corresponding puffy appearance in the subcutaneous tissues.

OTHER CONDITIONS SIMULATING CANCER.

Mazodynia (ὁ μαζὸς, the breast)=general hyperæsthesia of, or painful sensations referred to, the mamma, without objective tumour-formation. Is often, however, associated with some fibroma or cyst. Occurs mostly in women of neurotic temperament, who have lost a relative from cancer, or whose minds have otherwise been led to dwell upon the state of the part. TEA is a very common cause; if indulged in more than once daily, is an invariable aggravation. The lancinating darts of scirrhus carcinoma, with intervals of complete ease, are wanting; there is a more or less continuous ache, absent when attention is diverted.

Inflamed or Irritated Lobules.—This is most often seen in association with lactation, or with pregnancy, actual or recent, and it frequently results in suppuration, but not invariably so. It occasionally occurs in virgins, doubtless as a consequence of some uterine derangement. The presence of several entirely distinct "lumps," moderately hard, tender on pressure, and nearly equal in size, at different parts of the mamma, is generally sufficient to ensure recognition. The condition described by Gross (in a girl of sixteen) as "typical adenoma" (*Tumours of the Mammary Gland*, p. 111) is probably a chronic form of this irritative process.

CHRONIC SUPPURATION is, above all others, the breast-lesion most apt to lead to removal of the entire organ in mistake for cancer, and against which the practitioner needs accordingly to be most on his guard. When ACUTE there is rarely any possibility of error; a history of recent parturition or lactation at once suggests suspicion, and leads to correct diagnosis. But not very seldom an abscess is slowly formed when no such warning indications exist, when the woman is single and has never been pregnant. I have seen a very small pus collection

thus take place amid the lactiferous ducts at the root of the nipple in a single woman of advanced middle age. It produced lancinating darts of pain, did not fluctuate, was extremely hard, and was attended by slight glandular enlargement. A chronic abscess will be recognised by the fluctuation, tenderness on pressure, sensations of heat and throbbing, absence or non-progressive character of lymph-gland enlargement, &c. In case of doubt an exploratory incision is demanded.

Hard, chalky lumps of *inspissated milk* sometimes distend the ducts for a considerable period after lactation has terminated. They present no difficulty in recognition.

Ulceration about the Areola, usually of syphilitic origin, but occasionally simple, is often mistaken for Paget's disease, and sometimes even for malignant ulceration. The syphilitic is shallow, serpiginous, associated with coppery stains on the skin, and other characteristic lesions elsewhere; yields readily to anti-specific treatment, but if neglected may result in carcinoma of the deep parenchyma.

True Paget's Disease is very rare. Although commonly called "eczema of the nipple" it has nothing in common with ordinary eczema, being, according to Dr. George Thin, a "destructive dermatitis of the papillary layer." For an elaborate account of the microscopic appearances see *Path. Trans.*, xxxii. The disease is described at p. 95. In reference to the supposed coccidia see Dr. Wickham's *Maladie de Peau*, dite M. de Paget, Paris, 1890.

The nipple not infrequently becomes the seat of carcinoma, without antecedent breach of surface, as a sequel of some ill-habit of pulling or otherwise irritating the part. The fact is unfavourable to the hypothesis of causation by microbes.

Chronic *Mastitis* (μαστὶς, the nipple) follows blows or local irritation. There is induration and tenderness at and immediately around the root of the nipple. The condition yields slowly to inunctions of lead iodide with lanoline. It is often found in youthful males. Considerations of age generally suffice for the diagnosis.

Surgical Treatment.—The permanent eradication of breast-carcinoma is only feasible when the disease is recent, and is wholly limited to the breast and axilla. Its possibility is

greatly lessened by the lymph-gland infection being suffered to advance to the stage of enlargement before an operation is performed. Such conditions are rarely obtainable when the disease has existed for six months; the period of its actual discovery being usually a much later date. The great majority of operations are performed when cancer has been gradually developing for from ten months to two years. Such can be palliative only. In order to cure mammary carcinoma, free removal on the principles indicated should be effected within six to eight weeks of its inception. Should "recurrence" follow an operation performed within this period, that result may reasonably be ascribed to some error of judgment on the part of the operator, rather than to the intrinsic nature of the disease.

In excising a cancerous mamma, it is of the utmost importance not to regard the palpable tumour-formation as constituting the whole area of cancerous infiltration.

In ordinary carcinoma, in the later stages also of sarcoma, there is around the growth an invisible zone of infected tissue, containing cancerous cells or nuclei. The extent of that zone varies with the duration of the disease, with the condition of the mamma, the acuteness of chronicity of the cancer-process, &c. &c. Hence, all such circumstances require careful consideration before an operation is attempted; and the steps thereof require adaptation to every particular instance. The directions given in surgical text-books for "Excision of the Breast" should be held to apply only to non-malignant affections of the organ. For the extirpation of cancer therein, no general rule can be formulated; every individual case must be treated on its own merits. The following description is therefore approximative only.

EXCISION OF A CANCEROUS MAMMA.

First Stage.

The patient being anæsthetised, the arm on the side of the lesion is brought down to the side, and there held by an assistant. Two elliptical incisions are required; the first of these should under nearly all circumstances be the one which passes

nearest to the cancer, and should pass far down into the axillary region, wide of the tumour.

A second then curves around the other side of the mamma, commencing at the end of the straight incision, and joining the preceding at a quarter of an inch from its termination. The first is then carried directly down to the fascia, and the breast-tissue peeled off in the direction of the second. Unless adherent to the fascia, the breast is readily separated from the latter without the use of the knife.

Second Stage.

The arm is now raised above the head, until in the recumbent position it is at a right angle to the shoulder. The contents of the axilla are then completely evacuated, without fresh incision or further recourse to the scalpel. By tearing gently with the fingers at the axillary end of the previous incisions, complete access to the axillary cavity is readily gained, and the lymph-glands therein removed. The usual dressings will then be applied.

The above account applies to cases of carcinoma only. What is here styled the "second stage"—evacuation of the contents of the axilla—is unnecessary in those of true sarcoma. In the former condition, it is hardly ever wise to omit this procedure, unless considerations of advanced age, or other physical infirmity, render a brief operation imperatively necessary.

Too great violence in the axillary manipulation may lead to sloughing. If the lymph-glands, commonly embedded in fat, cannot be dislodged without forcibly tearing the tissues, it is best to resort to the scissors.

The position of the arm as above indicated is of importance. Held down to the side in the first stage, the incisions can be adjusted to the extent of the disease. Elevated above the head in the second, free access to the axillary cavity is procured, and the large vessels thrown into relief. It is advisable to dissect out the whole breast-parenchyma, partly on account of probable dissemination through this; but also to preclude the subsequent oozing of blood, which will delay healing.

Whenever the growth adheres to or closely approaches the pectoral fascia, the latter should be dissected off, and the

muscle carefully explored for secondary nodules. Under other conditions than the above it is not prone to infection, and may be left intact.*

The tissues through which the infection is most readily diffused from the primary nidus, are the *sub-cutaneous* and the *mammary parenchyma*. A wide area of each, apportioned to the necessities of each particular case, must be removed with the palpable tumour. The very desirable aim of a prompt convalescence must always be held subordinate to that of cure.†

The principal secret in securing quick and favourable union is to leave the wound as DRY as possible, and to maintain it in the same condition. No syringing should be resorted to unless sloughs are present; the discharges should be evacuated at each dressing by gentle pressure. A long drainage-tube acts as a foreign body in the wound, and is not required; a piece of india-rubber tubing, not longer than half an inch, at the end of the incisions, is generally amply sufficient to obviate retention of the exudation.‡

The Value of Special Diagnostic Symptoms.

Pain.—The sharp neuralgic stab of ordinary scirrhus, with intervals of complete ease, is a very valuable subjective sign, simulated only by very exceptional cases of chronic suppuration. It is always present in chronic carcinoma, but in the acute variety (encephaloid) may be entirely wanting. True *sarcomata* give rise to considerable suffering, generally more continuous, and without the intervals of complete remission, associated with incipient carcinoma.

Hardness.—In small atrophic mammæ the hardness of scirrhus is proverbial. But when the organ is large and fatty, the condition may be completely masked.

Acute encephaloid carcinomata show little or no induration.

* It is right, however, to state that the late Dr. S. Gross, a high authority on the point, peeled off the pectoral fascia apparently in all cases without exception (*Internat. Journ. of Med. Sci.*, March and April, 1888).

† For method whereby the edges of a widely gaping wound can often accurately be brought together, see *Reappearance of Cancer*, p. 63.

‡ The excision of BOTH mammæ for cancerous deposit is to be deprecated for reasons in the text.

Retraction of the Nipple.—A symptom much insisted on in the older text-books; but, *per se*, valueless as a sign of cancer.

It is a very common condition in many women apart from disease; then appears to be a result of nipple-irritation at some epoch or other. Often probably a remote sequel of the manipulations of ignorant nurses, who seek to “break the nipple-strings” of the new-born infant.

It is produced by *cysts*, or by other *benign tumours* arising amid the lactiferous ducts, and is a consequence of *chronic suppuration* amid these.

It is wholly absent in cancerous growths which appear in the outlying parts of the breast-parenchyma, and is found in association with cancer only when the lactiferous ducts are directly involved.

It is not seen in acute carcinoma (encephaloid), which growth pushes before it all the tissues, instead of drawing them in.

On the other hand, when it first begins, and then slowly progresses, in a woman aged thirty-eight upwards, it is often a valuable danger-signal. In a large well-developed breast, it may long be the only sign of a cancerous development, as until a considerable size has been attained by the proliferating acini, no tumour may be palpable.*

Enlargement of Axillary Lymph-Glands.—An early physical sign in scirrhus, late in encephaloid, carcinoma, absent in sarcoma. Women vary in the natural size of these organs, often one or two remain persistently enlarged after lactation or suppuration. It is a useful precaution to compare the glands on each side. Even when with carcinoma there is considerable increase in bulk, the condition may be wholly masked by fat, or by degeneration (softening). In stout people, the precise state of the axillary lymph-glands in cancer must long be a matter of uncertainty.

Moderate enlargement may result from suppuration, syphilis, &c.

The absence of this physical sign with a hard breast-tumour

* *Concealment of Symptoms.*—Dr. David Pearson has recorded the case of a woman aged sixty, who sought advice for jaundice and disease of the liver. The existence of an ulcerated scirrhus breast was only discovered after death (*Path. Trans.*, xxvi.). Similar instances are not uncommon.

of six months' duration, indicates that although the disease may be malignant, it is not a carcinoma.

Dimpling of adherent skin is a valuable sign of scirrhus cancer; rarely met with under any other condition. It is most marked in "atrophic" cases; is wholly wanting in the acute encephaloid.

General considerations important towards diagnosis—in particular, *age* and *causation-history*—have been pointed out in the previous chapter.

The excision of lymph-glands above the clavicle can very rarely be advised. When these are seen to be enlarged, the infection will have already extended to the mediastinal lymph-glands, and to the remains of the thymus. The supra-clavicular glands, *per se*, give no trouble, seldom progressing to suppuration, causing pain, or affecting appreciably the duration of life.*

Subsequently to excision of the breast for cancer, the patient should be kept under frequent observation for two years, during which any "recurrent" nodules in the subcutaneous tissue should be promptly eradicated. For superficial growths of this character, the application of the *potassa fusa* is generally the best.

After the lapse of two years (Dr. S. Gross extends the probationary period to three years), the patient should be carefully examined. If no tumour-formation can then be detected, if the general health be unimpaired, and if there be no symptoms of insidious marrow-infection, we are entitled to affirm that a cure has been effected.†

* In Sir James Paget's experience, verbally communicated to me several years since, no benefit to the patient had ever accrued from excision of the supra-clavicular glands; my own corroborates this statement. I have only once noticed infection of the *deep cervical* lymph-glands, lying on the common carotid, by a breast-scirrhus; and this occurrence was followed by the equally rare event of a metastatic deposit in the *brain*. The case is elaborately reported by our then house-surgeon, Mr. Cecil Beadles, in the *Lancet*, Oct. 3, 1891. His paper refers to several other instances of mammary carcinoma, with cerebral metastasis.

† Very rarely it happens that the liver, like the marrow, serves as a receptacle for insidious metastatic deposit, not productive of symptoms until several years have elapsed. For a case of this occurrence with even the acute Melanotic Sarcoma, see p. 181. I have noticed a similar event in connection with breast-carcinoma, once only.

It has been suggested that accidental inoculation may be effected by the scalpel, or by needle-punctures. The extreme difficulty of purposely inoculating the animals, not of the human species, with cancer, indicate that such a fear is groundless, and no clinical facts are known to exist in its support.

*Causes of Failure in procuring permanent immunity by a
Surgical Operation.*

An advanced stage of primary disease ; neglect of the axillary lymph-glands, always rapidly infected by carcinoma ; insufficient allowance for the "invisible zone" of infected tissue. Without due heed to the latter point, an operation for the removal of a carcinomatous breast is "a sham extirpation, not a real one."

Conditions entirely prohibiting an Operation.—Very large primary or secondary deposits ; extensive adhesions to the pectoral fascia ; ulceration, unless very superficial, or unless commencing at the areola ; indications of visceral or intrathoracic deposit ; of extensive subcutaneous-tissue infection. Impossibility of removing all palpable tumour-formation in the mamma. Deposit in the opposite mammary gland. Adherent skin, dotted with numerous punctæ ; the distended apertures of sudoriparous and of hair-follicles ; extreme physical debility or ill-health from other organic source.

A most careful selection of cases is always desirable ; the breast should not be excised as a routine measure. Heroic operations here, as everywhere else in cancerous disease, are totally devoid of any benefit commensurate to the risks and suffering incurred.

Palliative Operations.

In cases of carcinoma too advanced to permit hope of complete eradication, the removal of the lymph-glands in the corresponding axilla will assuredly obviate one of the most distressing phenomena of the disease in its later period—viz., *brawny edema of the arm*. Hence, the "second stage" of the operation above detailed will often contribute much more to the prolongation of life and prevention of suffering than the "first." This step takes the foremost rank among all those surgical operations on the cancerous breast which may be

described as palliative only. Even when symptoms of distant marrow-infection by carcinoma are present, removal of the diseased breast with the infected lymph-glands will considerably prolong life, and will secure scope for the beneficent effects of opium.

The extirpation by potassa fusa of sub-cutaneous nodules as soon as they are detected, involves transient pain, and often proves of great service.

The destruction of bleeding fungous masses by the *galvanic écraseur*, or by Paquelin's *thermo-cautery*, occasionally constitutes an exception to the rule of non-interference with actively growing cancer-parenchyma. (See preceeding chapter.)

Palliative Treatment (Medical).

Early and continued administration of opium in small doses very gradually increased. A useful formula for a case of ineradicable, but not painful, breast-cancer is from five to ten drops of Ferris' nepenthe, with ten of tincture of belladonna, and one to two drachms of glycerine, given in a bitter infusion night and morning. Or acetate of morphia, in doses of one-sixteenth grain, may be similarly mingled with a small quantity of belladonna, and taken at bedtime. When there is actual suffering, larger quantities of opium or morphia are needed. Women are very susceptible to the effects of opium, still more so to that of belladonna. It is sometimes necessary to omit entirely the latter; but when tolerated, this obviates constipation, and also enhances the anodyne effect. Constipation, always more or less of an evil, will be partially combated also by the glycerine, but whenever the services of a nurse are obtainable, a simple enema twice weekly is indicated. Systematic treatment in this manner previously to the stage of ulceration may entirely obviate that most painful occurrence; it materially checks local cancer-growth, confers comfort, prolongs life; a considerable measure of tolerance by the system is established; even partial absorption may ensue. Were it universally insisted on by the medical profession from the first indication of cancerous disease, there would hardly be so great a rush towards any reputed remedy of mysterious composition,

be it only WATER pure and simple, under a high-sounding title.* Good nursing and hygiene are useful adjuncts to the opium treatment. *Antipyrine* has a limited analgesic action, sometimes useful in diminishing the dose of morphia needed to ease pain.

Of local applications *strong lead lotion* (℥j of the liquor plumbi subacetatis to a pint of water, which need not be distilled), aids in diminishing the inflammatory phenomena of non-ulcerated cancer. It should be dabbed on the skin several times daily with a sponge and the part allowed to dry. Anything which tends to increase local heat, such as continuous dressings with a bandage, poultices, &c., is at this stage to be deprecated.

For a cancerous ulcer, the best and most universally applicable dressing is lint soaked in a solution of *menthol* (℥j to ℥j of olive oil). Menthol is one of the most powerful of deodorants and antiseptics; it has, moreover, a very grateful local anæsthetic effect. For a very fetid ulcer, two dressings daily will be requisite, and the whole should be enveloped in "antiseptic marine lint." No mal-odour should ever be tolerated in these cases.

Powdered *iodoform* is of use in aiding the separation of sloughs. When parts of the growth thus decay *en masse*, frequent *bread poultices* are indicated until the sore is cleansed. These applications, continued only for a day or two, are sometimes useful alternatives to the dressings habitually employed. They allay local hyperæmia.

For shallow ulcers an ointment of *eucalyptus oil* (℥j to the ounce of lard) is well adapted in some cases; this frequently appears to promote cicatrisation. Sometimes the eucalyptus ointment may be usefully combined with ʒss of iodoform to the ounce. The deodorant and antiseptic effects of iodoform, however, are both very feeble, and a copious use of this drug succeeds only in substituting one unpleasant smell for another.

When the dressings are changed, the part may be irrigated

* See analysis at my request by Mr. A. W. Stokes of some of the "Mattei Electricities," in *National Review*, Nov. 1890; *Brit. Med. Journ.*, Nov. 22, 1890-91;—a fair *reductio ad absurdum* of the popular rage for secret remedies.

with weak *carbolic* lotion, or better with *iodine*, in the proportion of ʒij of *linimentum iodi* to the pint of warm water.

For the attacks of hæmorrhage which unfortunately supervene in the later period of ulcerated cancer, the best application is *iron-lint* (lint soaked in strong *liquor ferri perchloridi*, B.P., and allowed to dry). A little piece is pressed on the bleeding point and allowed to adhere, being subsequently left *in situ* for forty-eight hours.

Equal parts of the liniments of *aconite* and *belladonna* may be resorted to for neuralgic pains in the vicinity of non-ulcerated cancer-deposits.

For "brawny œdema," the best plan is to keep the limb enveloped in lint soaked with strong lead lotion; over this, gutta-percha tissue and a bandage. Tapping by fine trocars or otherwise is useless and worse.

Whenever, after a surgical operation, there exists reason to apprehend reappearance of the disease, continuous treatment by small daily doses of opium should be at once instituted, or the patient should be instructed in the use of the opium-pipe. No moral objection to a permanent opium-habit can arise under such circumstances.

CHAPTER IV.

CANCER OF THE TONGUE.

Species.—Almost always *Epithelioma*; rarely, *Lympho-carcinoma* (derived from the lymph-follicles at the root, or in the adjoining mucous membrane). True *Sarcomata* are still more rare; tumours so reported are generally of embryonic origin (*Blastoma*); cases of melanotic disease (p. 181) probably rank with the latter.* *Carcinoma* may very exceptionally attack the mucous or serous glands.

Sex.—Chiefly males: women furnish only about ten per cent. of those suffering from epithelioma.

The causes of this remarkable disparity (which extends also to cancerous disease on the *face, lips, mouth, and pharynx*), are explicable by:

* In the human subject no pigment is normally present in this region. Dr. H. Greenhow has, however, found it in the sub-mucosa, under obscure neurotic conditions (*Pathol. Trans.*, xxiv.); the epithelium being normal. In Addison's disease, there is copious pigmentation of the deep epithelial cell-layers, corresponding to the Malpighian rete of the skin, the sub-mucosa being free (*ibid.* p. 229).

The hinder regions of the tongue are prone to nævoid growths, which may ultimately become papillomata (Wagstaffe, *Pathol. Trans.*, xxvi.), or cysts; or may degenerate, with deposit of pigment in the connective-tissue. In this manner, the very rare occurrence of melanotic disease may be accounted for.

The remains of the thyreo-lingual duct not seldom produce tumours, of a malignant character, at the root of the tongue.

On these congenital aberrations, Mr. Bland Sutton (*Evolution in Pathology*) remarks that the evolution of the tongue in mammals is not yet unravelled. "From anatomical and pathological standpoints the anterior two-thirds differ completely from the posterior third."

They are described as "*Blastomata*" in Appendix A.

- (a) "The greater attention to cleanliness, and to their personal appearance in general, which characterises women as contrasted with men."
- (b) "The comparatively faint proclivity of women to alcohol, particularly in the concentrated form of spirits. With this their abstinence from the practice of smoking" (*Proclivity of Women*, p. 9).

Causes.—Almost invariably, *continuous friction*; as by the sharp projecting angle of a tooth or tooth-stump. Rarely *sudden injury*, as by a scratch, bite, or burn.

The habit of *smoking* predisposes; not *per se*, but indirectly, by inducing a morbid condition of the epithelium, also by hindering the healing of any casual lesion. *Alcoholic drinks*, especially spirituous liquors, operate in precisely the same manner; as does anything which tends to "coat" the organs with unhealthy "fur."

Syphilitic lesions, common in men, comparatively infrequent in women, here strongly promote cancer. Any person exhibiting long-standing traces of past venereal infection in this part, is pre-eminently liable to epithelioma, by reason of that delay in repair, and tendency to ulcerate on slight provocation, which characterises the superficial scars or eruptions of chronic syphilis. The most common local indication of former disease of this kind is found in an absence of the natural healthy coat over large patches on the tongue, labial and buccal mucous membranes. The surface is sometimes livid, granular, circrhotic; more often there is but a scanty covering of epithelium, and the ordinary healthy red colour is replaced by what looks like a very thin opaque white follicle of cicatricial tissue.

There may be *redundancy of epithelium* in the form of the well-known "leucoplakia;" gummata, or warty vegetations, are found in a minority of instances.

Mental distress, worry, and anxiety are conspicuous elements in the vague category of "predisposing causes." But an exciting traumatic factor is always to be found as well; and it is uncertain how far these may operate indirectly, as by the resort to alcoholic drinks which they commonly involve.

Symptoms of Epithelioma.

This disease in the tongue almost always commences in a crack or abrasion; gradually results in infiltration, first of the sub-mucous connective-tissue, then of the deeper parts. Some trivial accidental lesion is therefore essential, as an antecedent to the cancerous developments.

When such an ulcer or erosion has been in existence for a brief period of weeks, attended only by sensations of soreness, occasional darts of stinging pain begin to be felt, with intervals of perfect ease. A little later, continuous "burning" in the ulcer is complained of, with casual neuralgic shooting pains in its vicinity.

Induration of the margin of the sore is now to be felt, usually concurrent with slight tenderness on pressure in the *lymph-glands* (about two in number) under the lower jaw on the same side as the disease, when unilateral. These glands soon show decided enlargement. They are close together, on the anterior edge of the submaxillary (salivary) gland; before incision, are felt as a single "lump" in that position.

The sore continuing to extend, all the symptoms become progressively aggravated. Loathsome foetor of the breath is an early symptom. Agonising neuralgic pains referred to the ear, to the parietal and occipital regions, are felt; and the general health gives way. There is distressing salivation, and the teeth fall out. Subsequently to the infection of the glands under the lower jaw, the *cervical*, superficial and deep, simultaneously betray deposit therein. They may suppurate, with the formation of numerous sinuses, or an open sore may result, which commonly fungates.

LYMPHO-CARCINOMATA begin as prominent rapidly growing tumours, attacking the hinder part of the tongue, and quickly developing into an ulcerated, very vascular "fungous" mass.

Variations in Phenomena, or in Mode of Inception.

Any part of the tongue may be attacked, especially when the individual is syphilised. But most commonly the edges are the portions which first show epithelial cancer, being exposed to continuous friction of the teeth.

When the *root of the organ* is the primary site, the symptoms

are often for some time obscure, and the patient may seek advice for that enlargement of the deep cervical lymph-glands, which speedily ensues, rather than for the disease within the mouth. In these cases, those lymph-glands under the lower jaw above alluded to may escape infection until a later stage; the deep *cervical* being the first recipients of metastatic deposit. There are sensations of soreness and slight pain on deglutition, with, *ab initio*, neuralgic pains referred to the ear. The *superficial cervical* glands are infected subsequently to the former.

Sometimes, instead of the single typical ulcer, with its hard cavernous ragged edges, the patient first applies with the whole tongue diffusely infiltrated, and general distinct sores are seen at different parts of the surface. Then the whole organ is puffy and œdematous; neither the margins of the ulcers, nor the parts beyond, show the characteristic induration. The cell-infiltration appears to meet with no resistance; it rapidly invades all the tissues in a mode analogous to that of encephaloid carcinoma. There is comparatively little pain until an advanced stage, but the breath is insufferably fetid, and the teeth quickly become loosened and detached.

As on the skin, epithelioma may be the sequel of a benign wart, or of syphilitic papillomatous vegetations; or it attacks the scars of old syphilitic sores.

Diagnosis.—The only lesions apt to be mistaken for cancer, are those of syphilis and tubercle. The tendency of old syphilitic ulcers to become malignant, enhances the difficulty in recognition. The sequence is very rare, however, in the young, and the period of life is the foremost element to be considered in diagnosis. Men are very seldom attacked by epithelioma before the age of thirty-four. The older the individual, the greater the probabilities of malignancy in any ulcerative lesion of doubtful character.

THE PURELY SYPHILITIC TONGUE is frequently shrivelled up and wrinkled, the whole organ is more or less denuded of epithelium, presents a mottled whitish appearance, often is small and pointed. We commonly find several shallow ulcers scattered about the dorsum with intervening ridges of tissue comparatively elevated and more or less bare. There may be sessile warty growths, usually multiple, of irregular shape with fringed and ragged edges. The adjoining mucous membrane of the lips and cheeks presents a very typical

feature, patches of faintly white discoloration, also many irregularly with tracts of healthy epithelium, the former appearance being due to shallow ulceration (or at least denudation of epithelium) and subsequent cicatrisation. There will probably be a similar condition on the soft palate and about the fauces. We may find (but not very frequently) the so-called "ichthyosis."

If a gumma is formed and breaks down, there will be no appreciable induration around, and the rest of the tongue does not undergo "glassy" oedema.

The lymph-glands under the jaw will be found slightly enlarged, as in ordinary tertiary syphilis. They will, however, remain small, very hard, permanently hypertrophied, and will not progress to suppuration. There will be no noticeable prominence under the sterno-mastoid.

Syphilitic ulcers are characteristically painless, and the breath is not fetid with the peculiar odour of cancer. Fissures at the angles of the mouth may be present, as well as other evidences of syphilis.

In *epithelioma not arising from syphilis*, we find at first an ulcer situated opposite to some source of irritation, as a projecting tooth. If very small, it will probably look healthy enough, and there will be nothing remarkable in its appearance; by degrees the margins become indurated, and very soon lancinating pain is complained of. Later on, the remainder of the organ becomes glassy and swollen. After ulceration has progressed, there is a characteristic fœtor of the breath. The adjoining teeth become coated with a foul deposit, and ultimately loose, and the gums spongy. Enlargement of the lymph-glands lying on the submaxillary appears very early. (To the touch the latter seems enlarged, but is probably never implicated, except by continuity of tissue.) These, however, do not become usually so hard as in syphilis, but increase rapidly in size; ultimately suppurate and discharge a thin ichor from one or more sinuses; may then form an open ulcer with deeply excavated centre, and the characteristic raised, everted edges. At an early period also the lymph-glands under the upper part of the sterno-mastoid on the same side become affected, and may cause a noticeable fulness in that situation. Unless syphilisation has occurred at some time previous, we shall not find the typical white staining of the mucous membrane on tongue, lips, and cheeks indicative of that event.

The most difficult cases to determine are those in which *syphilis results in epithelioma*. One of the ulcers above described deepens, extends, and becomes indurated around its margins, darting, burning pains commence, glassy oedema of the surrounding parts of the tongue, with fetid breath and progressive enlargement of glands, is soon seen.

But more commonly, when the patient is advanced in life and evidences of syphilisation have lasted many years, an ill-defined tumour deep in the substance of the tongue makes its appearance far back towards the root; rapidly enlarges and ulcerates, the sore presenting a characteristically irregular malignant appearance. This

form is most insidious; the patient being so accustomed to an abnormal state of the organ does not pay much heed to the new growth till far advanced. And unfortunately enlargement of glands (especially of those situated deeply under the sterno-mastoid) sets in very early. A very characteristic feature in the progress of lingual epithelioma, occasionally serving to distinguish this from syphilis, is presented by little white islands of epithelium which arise on the soft palate and on different spots on the cheeks and roof of the mouth, with which the diseased parts from time to time come in contact (*auto-inoculation*).

The microscope does not afford any aid, on which reliance can be placed, in the diagnosis of incipient epithelioma, and the plan of scraping suspicious lesions for examination by means of this instrument is more likely to mislead than to guide aright. Misshapen and abortive epithelial cells occur under other conditions than cancer.

The *SIMPLE ULCER* is characteristic by its recent appearance from some obvious cause, small extent, absence of pain, absence of surrounding induration, absence of gland-enlargement under the lower jaw, healthy condition of adjoining gums, absence of foul deposit on the neighbouring teeth, other than may reasonably be accounted for by delay or neglect of cleanliness. After the removal of the exciting cause—some projecting stump or edge of tooth when the ulcer is at the edge or tip of the organ—or in the case of the slight aphthous sores which may occur anywhere about the buccal cavity, after due attention to gastric conditions and to the general health—the lesion nearly always readily heals under the local application of a little pulv. boracis once or twice daily. Failing that result, there is cause for grave suspicion.

The *tuberculous ulcer* is readily recognised by its pallid, punched-out appearance, painlessness, and frequent, but not invariable, association with pulmonary phthisis. The patients are young, delicate, pale, strumous in appearance. Their tongues are flabby and exsanguine. The ulcer occurs usually on the dorsum of the organ, is solitary, roundish in shape, with pale soft edges, and indolent base. There is no hyperæmia, but the reverse of that condition prevails. The sore is solitary, remains stationary, causes no inconvenience, it may be accompanied by slight enlargement of the lymph-glands. It obstinately resists treatment, short of scraping or the cautery. I have once, and only once, seen the mucous membrane covering the GUM on the lower jaw of a young man covered by irregular tuberculous ulceration, closely simulating that of epithelioma, but painless.

The *causation-history* of any suspicious sore is important. The liability of epithelioma to attack the edges or tip, and the comparative exemption of the dorsum, are to be remembered. The subjective symptom, PAIN, is here of great value as a diagnostic sign of cancer; the patient being usually male. Any large cavernous ragged-looking sore, however malignant

in appearance, is, if painless, certainly not of this nature. Conversely, one shallow and superficial, without any induration of its margins, and in no way differing to the eye from a healthy ulcer, is almost certainly epitheliomatous, if attended by neuralgic pain not referable to the state of the teeth.

Care may occasionally be necessary not to mistake irritative enlargement of cervical lymph-glands, the result of a septic process in the throat, for secondary cancer deposit. (See case in *The Reappearance of Cancer*, p. 114.) If lymph-glands enlarge "out of their turn"—i.e., if the cervical are affected by lesions of the fore-part of the mouth, which should normally implicate the submaxillary—the symptoms may be safely pronounced non-malignant.

Prophylaxis.

Epithelial cancer of the tongue, as of the lips and adjoining mucous membrane, is rarely other than the simple result of neglect. When the actual state of the mouth-cavity is excluded from consideration, and not the least reason can be discovered for supposing that any one individual is more likely to suffer from such disease than another—given the fact of exposure to the same cause—the effect appears identical in all, without respect of persons. It is nearly always obvious that the development of epithelioma in these parts might have been easily precluded by precautionary measures of the simplest.

The chief of these is prompt recourse to the services of the dentist, whenever the tongue is chafed by a projecting stump or tooth, which latter need not be diseased. Senile absorption of the lower jaw may throw healthy teeth into undue prominence; most commonly, however, the sharp, jagged edge of one decayed or broken proves the exciting cause.

Next in importance ranks attention to the condition of the mucous lining generally, and in particular care to secure the speedy healing of any casual crack, burn, or excoriation; such will nearly always readily cicatrise, when suitably dealt with; in no part of the body is repair after injury normally more rapid. The avoidance of alcohol, of smoking, of all articles of food or drink which produce an unhealthy condition of the buccal epithelium, is indicated.

Surgical Treatment (Curative).

The cure of lingual epithelioma can hardly be anticipated unless the diseased parts are removed within six weeks from inception. With the slightest probability of epithelial cancer, not a day can be wasted in merely tentative treatment; a very short space of time thus spent will usually ensure an agonising death. In no other part of the body does cancer ultimately involve more terrible suffering; or, while seemingly trivial, more rapidly infect the lymph-glands. Under no other circumstances are the consequences of delaying the removal of these organs until they are manifestly enlarged, more painfully conspicuous.*

For small and recent epithelial sores, it is of course unnecessary to excise the entire organ, or even a (lateral) half. It is sufficient to remove the lesion, together with a sufficiently wide area of apparently healthy tissue around. When the fore-part of the tongue is attacked, the most suitable weapon for this purpose is Paquelin's cautery, the edge of the straight blade being used as a cutting instrument to shave off the infiltrated structures.

When the *posterior* regions are in question, the thermo-cautery is a dangerous instrument, on account of the difficulty in bringing the lesion into view, and in checking hæmorrhage, should the lingual vessels be wounded. The *galvanic écraseur* is then preferable. In order to adjust this it is generally necessary to split the tongue by Mr. Morrant Baker's method, and to remove with the wire-loop the lateral half on the diseased side. Occasionally it is possible to secure complete ablation by perforating the diseased part with mounted needles which act as guides to the burning wire, or by grasping the whole with a vulsellum, and passing the loop around the base of the

* As a typical illustration of this rapid gland-infection and its deplorable results, a case recorded in my *Clinical Notes on Cancer*, 1883, p. 62, may be referred to. A man, aged forty-nine, was medicinally treated for a fortnight; then a healthy-looking shallow ulcer, with no induration of its margin, and about half as large as a threepenny-piece, was shaved off the right edge of the tongue, by the thermo-cautery. There was no lymph-gland enlargement; but the disease quickly reappeared under the jaw, and proved fatal, the tongue remaining healthy to the end.

tissues thus held up. These methods apply to superficial deposits only.

Simultaneous removal of the proximal lymph-glands is an essential part of all operations which aim at more than temporary palliation. Those on the anterior edge of the submaxillary are easily reached by an incision begun half an inch below the body of the lower jaw, and slightly in front of its angle. This is carried forward for two inches in a direction parallel to the bone. When the platysma is divided the salivary gland appears, with the facial artery sometimes lying on its anterior surface, but more commonly traversing its substance. The lymph-glands sought are two, often three, in number. When not enlarged, they are dragged forward in the upper lip of the wound; and then rest embedded in fascia, upon the edge of the bone. When much increased in bulk, they displace from its position the salivary organ, and become intimately adherent to this, so that it may be necessary to remove both. Under ordinary circumstances they can be dissected out without incising the submaxillary and without damage to the facial blood-vessels.

The cervical glands, superficial and deep, will be reached by an incision along the anterior edge of the sterno-mastoid muscle. The latter are in contact with the large vessels, and are intimately associated with the sheath of the internal jugular vein. The question of removing these previously to enlargement, is one which hardly ever arises in actual practice; subsequently, their eradication is of rarely more than temporary avail from the numerous lymphatics and glands which here abound.

The median *raphé* of the tongue offers no impediment to epithelial infiltration. In cases of recent unilateral disease, the tongue may be split in two by the method bearing the name of Mr. Marrant Baker, and the corresponding half excised by the galvanic wire. But it is unsafe to do this unless the lesion is superficial and still far from the middle line. When the cancer approaches the tip of the tongue, and is not of long duration, the anterior half or third of the tongue throughout its whole thickness should be removed, and it is best to simultaneously eradicate the submaxillary lymph-glands on *both* sides.

Whenever doubt arises, not as to the nature of the disorder, but as to whether part of the tongue may safely be left, the patient should receive the benefit thereof, not in a more sparing operation, but in the direction of greater severity. Compliance with the requests naturally preferred under such circumstances by anxious relatives, seldom fails to involve bitter repentance by all concerned. Complete removal of the tongue involves no appreciably higher immediate risk than the partial and but slightly enhanced detriment in the future. The articulation is temporarily thick, but greatly improves with time, and may become almost perfect. (See case in *Reappearance of Cancer*, p. 15.) Such trivial disadvantages cannot be weighed against the prospects of a "recurrence."

For excision (total) of the tongue, the barbarous methods of a former time, such as the operations of Regnoli and Sédillot, may be at once discarded from consideration. Three desiderata are apparent, and the operator should adopt whatever plan will

- (a) Serve best to eradicate the cell-infiltration ;
- (b) Involve least hæmorrhage ;
- (c) Necessitate the shortest possible period of anæsthesia.

The avoidance of all unnecessary bleeding is essential, for several reasons. The parts concerned are normally vascular, and under the influence of cancer abnormally so. The organ has to be forcibly dragged forwards; thus, throughout the following proceedings the aperture of the glottis is held patent. Not only blood, but septic discharges and detached fragments of cancer-parenchyma pass down the trachea, and subsequently induce a septic pneumonia. The latter complication is apt to follow severe loss of blood from any cause; this risk is enhanced by a prolonged period of anæsthesia, diminishing the strength of the respiratory efforts, and leaving the tubes clogged with mucus.*

* The plan of operating with the patient's head depressed over the edge of the table, does much to obviate the passage of blood, &c., through the patent glottis. That forcible traction forwards of the tongue involves the latter condition is readily demonstrated upon the cadaver; the organ being firmly grasped at a distance of NOT LESS THAN ONE-THIRD INCH FROM THE TIP.

A very instructive instance of cancer cell-grafts passing down the trachea

Cutting operations by knife or scissors have the advantage that the incisions can be adjusted to the requirements of the individual case, and to the local course pursued by the infiltrating cells. In practised hands, such as those of Mr. Walter Whitehead (*British Medical Journal*, May 2, 1891; 195 cases), they have proved safe and efficient. A good light and complete anæsthetisation are essential. The mouth being held open by one, or sometimes by two, lateral gags, the tongue is transfixed by a handled needle armed with silk thread, the loop caught, and the needle withdrawn. The organ is subsequently held well forward by an assistant. The next step is to clamp with a long curved Wells' forceps the reflection of the mucous membrane at the anterior pillar of the fauces, and then to divide this with scissors, a step which allows the tongue to be pulled into view, and greatly facilitates the subsequent procedures. The frænum and adjoining mucous membrane are then incised in the same manner, and the tissues divided from tip to base, the lingual arteries being, if possible, secured by pushing Wells' forceps into the soft parts, and cutting upon these as upon a director. If this manœuvre be properly carried out, and the parts divided are healthy, there is very slight bleeding. If the floor of the mouth is involved, however, it will be impossible to prevent considerable hæmorrhage.

It is advisable to have in readiness a supply of stick-sponges, enveloped in *iron-lint* (lint soaked in strong liquor ferri perchloridi and dried). These are most useful whenever hæmorrhage into any deep and dimly seen cavity takes place. Firm pressure with one or more arrests all venous oozing, and enables offending vessels to be grasped and tied.

during an operation is narrated by Mr. Rickman J. Godlee (*Path. Trans.*, xxvii.). A man, aged fifty-six, had his tongue excised by Mr. Erichsen. There was copious hæmorrhage, blood flowed down the windpipe, death from asphyxia was averted only by laryngotomy, and by subsequently sucking out fluids through the artificial opening. The patient recovered, but in six months began to suffer from severe chest symptoms, combined with an epithelial growth on the fourth right toe. After death, an enormous mass of epithelioma was found in the *right lung*; it involved the *ribs*, *mediastinal glands*, and *pericardium*, causing a prominent pulsating tumour of the chest-wall. In the left lung were only two or three nodules. The tumour on the toe was apparently due to distal propagation by the blood-current.

Compression of the lingual artery within the mouth against the hyoid bone, or of the carotid in the neck, is occasionally needed.

Mr. Jonathan Hutchinson prefers the wire *écraseur* for removal of the tongue, and occupies at least an hour in the operation (*British Medical Journal*, Dec. 1891). The method is safe and bloodless, complying with the principles above indicated. The prolonged anæsthesia which it involves is its principal defect.

The mode most generally preferable for tongue excisions, general or partial, is that by the *galvanic* *écraseur*. Its advantages are :

- (a) There is no bleeding whatever when the instrument is properly used ;
- (b) A residual eschar is left, which temporarily precludes septic absorption, and which ensures more perfect eradication of the cancerous parenchyma.
- (c) It can be resorted to for palliative operations when any cutting surgical procedure would prove certainly fatal.

Certain disadvantages have also to be reckoned with. If anæsthesia be imperfect, and there be much struggling, it is difficult to keep the wire-loop in position. Unless a competent electrician be in charge of it, the current may suddenly fail at the most critical moment. If too strong a current be employed, there will still be hæmorrhage.

In using the galvanic *écraseur*, it is necessary to procure a good light, perfect insensibility, and efficient assistance. When the loop is placed around the organ, it must be pulled tight by the screw handle before the circuit is completed. A Groves' battery is best ; and only sufficient cells of this to ensure very gradual division of the tissues should be brought into the circuit. If too powerful a current is employed to heat the wire, there will not only be bleeding from the too rapidly divided lingual arteries, but also considerable risk of secondary hæmorrhage subsequently. When the battery is more cautiously used, the latter event in any appreciable degree is rare, and is generally due to careless syringing, &c., within the mouth.

If, after removal of the organ with the galvanic *écraseur*, the tissues infiltrated are not effectually eradicated, any suspicious part should be grasped with a *vulsellum*, and slowly burnt off with the sharp blade of the thermo-cautery.

Ligature of the lingual arteries in the neck, preliminary to operations on the tongue, involves prolonged anæsthesia, and is unnecessary. Should scissors be employed in the absence of the *écraseur*, the arteries can be as efficiently secured before division by pushing the blades of a long Wells' forceps deeply into the soft tissues in the manner already described.

Subsequently, a mouth gargle of *Barff's Boroglyceride* (7 per cent.) is preferable to the efficient, but nasty, Condyl's fluid. For feeding purposes, a soft india-rubber tube, adjusted to the mouthpiece of the ordinary porcelain feeder, and passed well back into the mouth, the patient lying on his side. It is seldom necessary to introduce a tube into the œsophagus for tongue operations. When that measure is indicated, a No. 10 gum-elastic catheter, attached by india-rubber tubing to a funnel, will be requisite.

Subsequent syringing of the mouth is greatly to be deprecated, as tending to cause too rapid separation of the sloughs, with consequent hæmorrhage. The mouth-cavity should be kept aseptic by the individual's own efforts.

By Mr. Nunneley's plan, an incision is made with a bistoury below the lower jaw, in the middle line, into the floor of the mouth. The platinum wire-loop is thus introduced through this in front of the *frænum*, and the tongue then included, an efficient grip of the entire organ being thus obtained. I have also found it advantageous, when unilateral removal of the submaxillary lymph-glands was necessary, to cut down upon the submaxillary salivary gland; to remove this with the lymph-glands in juxtaposition, and to pass the wire-loop around the tongue through the incision thus made.

Palliative Operations.

The latter days of a sufferer from tongue epithelioma, in whom the cancerous disease has been allowed to proceed unchecked, are passed with the mouth-cavity filled by a fetid

mass, which greatly interferes with the taking of nourishment, and in several other ways proves the source of indescribable torment. Hence, well-considered surgical measures are essential; in order not only to prolong existence, but still more to obviate one of the most painful of all natural modes of death.

Such the benefit, in prolongation of life and preclusion of suffering, that a palliative removal should always be advised unless the conditions are such that the administration of an anæsthetic would involve imminent risk. But no cutting operation should ever be attempted in an advanced case; when a very slight loss of blood would probably be fatal.

For a palliative excision, the wire-loop of the *galvanic écraseur* should be passed around the organ within the mouth, and as much as possible slowly burnt away; the *thermo-cautery* or *galvanic* ditto being subsequently applied to any residual shreds of diseased tissue. Burning away any cancerous parenchyma does not, like cutting or tearing it, enhance the rapidity of cell-growth, but, on the contrary, rarely fails to check this very materially.

It is useless, in such a condition, to interfere with the lymph-glands.

Palliative Medicinal Treatment.

Cancer of the tongue in its later stages produces local pain of a "burning" character, accompanied by excruciating neuralgic darts in the adjoining ear, scalp, and side of the face, due to implication of the numerous sensory nerves. In order to subdue these, much larger average doses of *morphia* are commonly required than with malignant disease of any other part of the body. The sufferers being generally men, who are far more tolerant of morphia than women, a quarter of a grain of morphia-acetate twice daily will seldom prove too large an initial dose. It is generally necessary quickly to increase the amount, and to multiply the frequency of the administration until ease is procured. *Belladonna* (which also males bear better than women) may be conjoined in fifteen-minim doses of the tincture. This enhances the analgesic influence of morphia, likewise checks the troublesome salivation. Subsequently, *antipyrine* may be added with advantage.

Locally, a mouth-wash of *chloralum* (1 in 40) is most generally useful; it has a local anæsthetic effect in addition to its antiseptic and astringent qualities.

Cucaine solutions painted on the mucous membrane, or sprayed on the part, check the pain which the continuous motion of the parts involved, and often greatly alleviate. When excessive factor, *menthol* (3ss to ʒj of *almond oil*); watery solutions of *carbolic acid* are too volatile to be of much service; but the *glycerinum acidi carbolici* painted on with a brush, is often beneficial. Also *cucaine lozenges*.

The *opium-pipe* is a great comfort. The pain-subduing properties of *opium* and its derivatives are usually so conspicuously needed, that there is seldom question of administering these drugs for the purpose of checking malignant cell-growth. Whenever, however, after an operation there is reason to dread "recurrence," continued opium-treatment should be resorted to without delay.

To enlarged and non-ulcerated cervical lymph-glands, strong *lotio plumbi* (ʒj ad Oj) may be applied night and morning with a sponge; and topical agents similar to those recommended for mammary carcinoma, according to the various stages of the deposit, must be resorted to.

Prognosis, &c., after Operation.

The patient should be carefully watched for a twelvemonth after curative removal of the tongue. If no reappearance can then be detected, such an event is all but impossible, considering the acute course of the disease.

Neuralgic pains passing into the ear are of bad augury, even when no local growth is to be found. They are occasionally, however, of dental origin.

CHAPTER V.

CANCER AFFECTING THE LIPS, JAWS, FLOOR OF MOUTH, PHARYNX, NARES, SOFT PALATE.

The Lips.

Variety.—Almost always Epithelioma. A case of Melanotic Epithelioma in a woman, aged thirty-seven, is recorded in the *Path. Trans.*, xxxvii. Quasi-malignant tumours containing cartilage or bone, proliferous cysts, &c., are very rare pathological conditions of probable congenital origin (Blastoma).

Site.—The particular site affected by epithelial cancer is determined by relative exposure to the usual causes. Here the *prolabium* of the *lower lip* is the part most often attacked. At the junction of cutaneous with mucous structures, fissures casually occur, which, on the lower lip of males, are subsequently exposed to continuous irritation by smoking implements. The *upper* is, in men, an exceptional situation; of the few cases which appear in the female sex, many, however, there commence.

Next to the lower lip, the *commissure* is, for similar reasons, a common starting-point. The *cutaneous surface* may be first attacked, particularly when a wart is the forerunner.

Of 160 cases collected by Mr. Jessett (*Cancer of the Alimentary Tract*), the upper lip was attacked in 140 instances, the lower in 5, both (*i.e.*, from origin at the commissure) in 15. In 20 Cancer Hospital patients, the lower lip was the site in 18 instances, the commissure in 2.

Sex.—Usually males. Of the 160 patients above referred to, only 3 were female. The last-named 20 were all men.*

* In the *Brit. Med. Journ.*, April 2, 1892, Mr. Cecil F. Beadles, a former

Causes.—Those of epithelioma elsewhere. Syphilis, chronic alcoholism predispose; projecting angles of teeth, the use of the pipe, &c., directly excite. Sudden injury may cause a wound, subsequently prevented from healing by one of these agencies. The frequency with which the lower lip of males is attacked can be referred only to their smoking habits, the upper escaping direct contact with the pipe.

Women are remarkably exempt from epithelioma of the lips, tongue, mouth, face, and pharynx, being more careful of their personal appearance than men, and less prone to those habits which lead to this species of cancer. (See detailed discussion on the sexual disparities of malignant disease in *The Proclivity of Women to Cancer*). For like reasons, epithelioma in these regions prevails much more among the proletariat than in the well-to-do classes.

Age.—The bulk of patients average 40–60 years; the disease is rare before the age of 35. Of 13 cases by Mr. Sibley, 5 occurred at ætat. 40–50, 4 at 50–60. Of 20 in my own practice at the Cancer Hospital, 3 patients were between 30 and 40; 5 ætat. 40–50; 4 ætat. 50–60; 7 ætat. 60–70; 1 at the age of 80.

Symptoms.—First there is an ordinary crack which causes no pain, but is prevented by some means from healing. After long delay in union occasional darts are felt, and the edges become hard and livid. A thin fetid discharge exudes; under exposure, this dries up into a blackish scab. Continuous burning pain is now complained of, and enlargement of the submaxillary lymph-glands, bilateral should the disease be in the middle line, is detected. Progress is usually slow as compared with the corresponding tongue disease, but is steadily continuous. In the later stages the lower jaw is infiltrated, and the lip is occupied by fungous ulceration. Huge masses of infected lymph-glands, in various stages of

house-surgeon of the Cancer Hospital, points out that in the previous three years that institution had received 65 males with lip-epithelioma, against 3 females. Rather curiously, in two-thirds of these, the upper lip was the site. The Middlesex Hospital tables in the *Med.-Chirurg. Trans.*, xlii., record 27 cases of lip and mouth epithelioma in men, 3 in women. Sir J. Paget's 500 cases (*ibid.*, xlv.) report 25 epitheliomata of lip and cheeks in males, 4 only in females.

suppuration or ulceration, distend the neck on both sides. Should the primary cancer have been surgically removed at an early period, without attention to the glands infected, the bulk of these may strikingly contrast with an almost invisible scar on the lip, the only trace of the former.

Variations.—When syphilis is a predisposing cause, the adjoining tracts of mucous membrane show a whitish glaze, patchy, irregular; with probably indications of like import on the tongue.

The rate of progress is very variable; the younger and more vigorous the individual, the more acute usually the disease. Even in the youthful, however, chronic syphilitic fissures or excoriations, indurated, painful, very rebellious to aught but radical measures of treatment, hang for several years upon the borderland of malignancy. On the other hand, an epitheliomata of the lip may infect the lymph-glands within a few weeks, and may rapidly progress to fungous ulceration.

Diagnosis.—The only lesions which can well be mistaken for epithelial cancer of the lip are syphilitic, whether primary or remote. The latter may eventually develop epithelioma, but the sequence is less frequently seen than with malignant disease of the tongue.

A primary chancre on the lip is recognisable at a glance by its "angry" appearance. There is much greater lividity of the parts around than with the cancer, yet a striking absence of pain. The recency of the development contrasts with its prominence and bulk; there is little or no induration around; the lymph-glands enlarge but slightly.

Remote syphilitic lesions are distinguished by their superficial character, with an absence of hardness at the edges; by the presence of several distinct ulcers or excoriations, by their painlessness and chronicity; by the co-existence of the whitish glaze above described, in patches on the mucous membrane of the lips or cheeks, of "ichthyosis linguæ," or of other indications of old-standing specific infection. The lymph-glands under the lower jaw are slightly enlarged, very hard, and not tender to the touch.

An epithelioma of the lip, often round and prominent, may be irregular in shape, and extend over the whole border. It is

always a single continuous ulcer; there is generally severe burning pain. When, however, there is free fungous growth, with slight infiltration of the deeper tissues, the suffering may be relatively slight.

Treatment (Curative).—The new growth should be excised with due marginal allowance for the area of impalpable infiltration, by the classical V-incision. With this, the dangerous submaxillary glands should be removed by a submental incision; on both sides, should the disease be central; on that of the lesion, should the disease be unilateral and recent.

The relative chronicity of many cases permits a large measure of success to operations, which effect the removal of the primary lesion only. According to Mr. Butlin (*Operative Surgery of Malignant Disease*, p. 113), the average of cures thus obtained in the practice of eminent German surgeons is 38 per cent.*

The early date at which the submaxillary lymph-glands usually become infected, the facility with which they can be eradicated, and the deplorable results of permitting them to undergo enlargement before removal, indicate that the precaution of excising them simultaneously with the diseased lip should never be omitted. Without this procedure, the disease "recurred" within three years, in $\frac{264}{424}$ patients referred to (*op. cit.*) by Mr. Butlin.

In the performance of the customary V-operation, followed by the employment of hare-lip pins, it is a point of some importance to have an assistant standing on either side, each of whom compresses the facial and other blood-vessels against the lower jaw throughout the manœuvre, not relaxing his hold until the silk cord has been adjusted. Without such an arrangement, the free hæmorrhage will militate against careful and sufficiently deliberate removal of a sufficient "zone." The most dangerous tissue is the sub-mucous near the bone, and it is precisely this which would be reflected in a too hurried operation. It is sometimes best to check the bleeding temporarily after a V-piece of tissue is removed, with Wells'

* It may be doubted whether similar good results have been obtained by any English operator, who has disregarded the glands.

forceps, until a further supplementary area has been dissected out. Any projecting tooth must be simultaneously extracted.

Treatment (Palliative).—When a large amount of disease is present, it is best to disregard wholly the traditional V-incision, and freely to remove the growth without regard to a temporarily unsightly appearance. Repair is here very rapid, and the manner in which Nature takes steps promptly to remedy very ugly tissue deficiencies, extremely remarkable. The use of hare-lip pins is necessary to restrain hæmorrhage at the time. A plastic operation is never required, even when the whole of the lower lip has been excised.

Interference with the submaxillary lymph-glands must here vary with the stage of the disorder. It will be best to excise them if freely movable; if large, and fixed firmly to the bone, no advantage can be gained by such a step. *Opium* for internal administration; menthol lotion (5ss to ʒj of almond oil) for open sores; applications of *eucaine* solutions to allay the suffering caused by friction against the teeth, are among the necessary measures of treatment.

Prognosis after Operation.—Three sites need subsequent watchfulness: the lip itself, the submaxillary lymph-glands, and the cervical below the angle of the jaw. If the disease be not wholly eradicated, "recurrence" will normally appear within six months in one or other of the above. It is best to keep the individual under close observation for two years, after which he may be pronounced permanently cured.

The Lower Jaw.

Varieties, &c.—Any primary cancerous growth may be a *sarcoma* (spindle-celled or mixed-celled). Such most frequently commence in the periosteum, may contain giant-corpuscles, are occasionally associated with cyst-formation. They often attack the gum, constituting the familiar epulis; and appearing as the result of antecedent congestive conditions, due to decayed teeth. They may thus be the sequel of a benign fibrous tumour, bearing the same designation; and irritated into malignancy by inefficient attempts at extirpation. Sarcomata do not implicate the lymph-glands, except by contiguity.

The bone is very often secondarily infiltrated by cancer of

adjoining parts; in the majority of instances, *epithelioma* of lips, tongue, or buccal mucous membrane. Under ordinary circumstances, the sequence is sufficiently obvious. Occasionally, however, very extensive tumour-formation is the result of a minute epithelial lesion, removed by surgical methods two or three years previously, usually from the lip. The patient is ignorant of the causal association, and until examination reveals the existence of an almost invisible scar, the case may readily be mistaken for one of primary disease.

Another instance of secondary invasion, still more obscure, is afforded by the huge fungating masses which very rapidly grow within the deeper recesses of the mouth-cavity. They consist of small round or ovoid cells, and are often incorrectly described as "round-celled sarcoma." Their real source is the abundant lymphoid tissue near the angle of the bone (*lympho-carcinoma*), sometimes one of the lymph-glands in that situation. They speedily infect adjacent glands, and also distant viscera. The gland-enlargement does not become conspicuous so early, or progress so rapidly, as in connection with epithelioma.

Residual foetal structures, such as the remains of Meckel's cartilage, of the thyreo-lingual duct, &c., occasionally give rise to obscure forms of tumour in the pharyngeal region, and in association with the parotid gland, which display malignant phenomena, and involve secondarily the lower jaw (see *Blastoma*).

By cancer of Epithelial origin, males are most commonly affected, and at or after middle-age; epithelioma being rare in women, and in the young. On the other hand, the *Sarcomata* and *Lympho-carcinomata* neither specially attack the male sex, nor strictly conform to the general age-rule. Of 14 cases tabulated by Mr. Butlin (*Sarcoma and Carcinoma*), 6 occurred in males, 8 in females. One was developed in a child of 5; 4 at *ætat.* 10-20; 4 at 20-30; 3 at 30-40; 1 at 50; 5 were giant-celled, 5 spindle-celled, 3 mixed-celled, 1 "round-celled."

Causation.—Some antecedent congestive condition usually precedes the development of sarcoma or epithelioma upon the periosteum or mucous membrane of the gums. The conservative tendencies of modern dentistry prove a fertile source of both, by involving the retention of decomposing stumps, which act as irritants to the tissues around.

Treatment.—The localisation of true Sarcomata and their exemption of the lymph-glands favours the prospects of cure by operation, even in advanced cases of disease.*

Per contra, operative measures are out of the question when the bone is to any extent infiltrated by Epithelioma. In the very acute Lympho-carcinomatous growths, excision is rarely of more than temporary avail. Ligature of the common carotid artery is sometimes necessitated by these latter, in order to preclude imminent death from hæmorrhage, but that measure exerts no appreciable influence on the progress of the disease.

As an instance of a rare and, I believe, hitherto undescribed condition simulating epithelial cancer, I once encountered a case of tubercular ulceration extending along the alveolar process of the lower jaw. The patient was a man, aged forty-three, a smoker, and free liver; he was sent to me by my friend, Dr. Whitelaw Bourns. The right gum was occupied by an irregular ulcer anterior to the last molar; it bled readily when touched, the breath was very fetid. Two decayed teeth had been extracted, and two small pieces of necrosed bone had exfoliated; the sore extending to the floor of the mouth, the tongue being healthy. There was a mass of enlarged lymph-glands under the jaw on the same side, passing deeply into the neck; those on the opposite were slightly enlarged and tender. The patient described the disease as having originated around a carious tooth; but was uncertain when it commenced, as the teeth had been troublesome for several years. He complained of occasional darting pain passing up into the ear; death eventually took place from tubercular pneumonia. A microscopic examination of the parts affected revealed the presence of tubercular giant-cells, and absence of any cancerous element.

The Floor of the Mouth.

Epithelioma often primarily attacks the floor of the mouth, generally near the frænum, besides extending to that region from the tongue or gums. Unless encountered in a very incipient stage, it is here most unfavourably situated for the prospects of curative surgery. The three factors of rapid local

* A case of permanent recovery after the excision of a spindle-sarcoma, which, commencing as an epulis, had invaded the entire body of the jaw, with a considerable projection into the floor of the mouth, is recorded in *The Reappearance of Cancer*, p. 32.

diffusion, by the abundant lymphatic and blood-vessels of the sub-mucosa, proximity to the periosteum of the lower jaw, and tendency to infiltrate the tongue, combine to hinder complete eradication.

Treatment.—Even recent cases often demand extensive operative measures. Beside the visible ulcer with a wide margin of seemingly healthy tissue around, it may be requisite to excise that portion of the jaw which is approached by the cancer, probably the anterior half of the tongue, and the submaxillary lymph-glands on both sides. Here the *submaxillary salivary glands* also become implicated by direct invasion, and one or both will need removal as a rule. Should the lesion fortunately be wide of the periosteum, less severe procedures will of course suffice.

In a more advanced stage, the sufferer's interests are best promoted by the adoption of less radical measures. The bone should not be interfered with. Excision of the primary sore by the thermo-cautery, with removal of the submaxillary lymphatic glands, will materially prolong life and lessen future suffering. Sometimes free cauterisation of the ulcer is all that can be recommended, thus much temporary relief of symptoms and retardation of the local infiltration. The local use of *eucaïne* solutions applied with a brush considerably alleviates the suffering in these painful cases.

The Upper Jaw, Nares, Pharynx, Soft Palate.

Variety.—The Upper Jaw is comparatively seldom the seat of primary malignant disease. *True sarcomata* may here arise, generally in the periosteum, as the result of carious teeth, of blows or falls. Of 160 cases of sarcoma in bone tabulated by Mr. Butlin, none are referred to this.

As epithelioma is infrequent in the upper lip and roof of the mouth, the upper jaw is also much less often secondarily infiltrated by buccal or labial cancer, than is the lower. It is invaded by any form of malignant growth in the vicinity, by *epithelioma*, *lympho-carcinoma*, or *carcinoma* of the nares; by *melanotic sarcoma* of the eyeball; by *glioma*; by *rodent ulcer* or *epithelioma* commencing on the face; by *sarcoma* of the nasal bony structures, &c.

The Nasal Cavities may develop *epithelioma* from their lining membrane, *sarcoma* from the periosteum, *carcinoma* from the mucous glands, *lympho-carcinoma* from the lymphoid tissue. The first is the species most often met with; true carcinoma is rare. All varieties are apt to throw out fungating masses. When these are found in the antrum, they may be mistaken for primary tumour-formations in that cavity.

The Pharynx may be the primary seat of *epithelioma*. Here, however, *lympho-carcinoma*, developed from the lymphoid cells of the tonsil, is the paramount variety. The adenoid tissue and lymph-follicles scattered throughout this region may give rise to malignant growths of the same species.

The fungous masses described as "naso-pharyngeal polypi" are sometimes a malignant form of the "adenoid" vegetations (hypertrophied pharynx-tonsil of Luschka), here common in children, therefore *lympho-carcinomata*. Sometimes they are true *sarcomata* developed from the periosteum of the bony structures.*

The Soft Palate is liable to *lympho-carcinoma*, derived from its included "adenoid" tissue. But the tumours of this region—malignant, quasi-malignant, or benign—if examined in an early stage, betray indications of origin from some unobliterated foetal vestiges, and rank in the class of Blastoma (*q.v.*). Their inherent cancerous tendency may long remain in abeyance; and when the cancer-process has actually commenced, its congenital source may be readily obscured by the luxuriant cell-proliferation which then usually characterises the mass.†

* Many, if not most, new-growths in the palate or pharynx must be referred to persistent foetal structures. Palatine dermoids arise from faulty closure of the median cleft; millet-seed bodies known as "epithelial pearls" are common on the palate of the new-born child; "neoplasms perfectly innocent in their nature, but full of epithelial nests, occur in the palate" (Bland Sutton, *Dermoids*, p. 45). Obsolete canals, especially the thyreo-lingual duct, are also a common source of tumour-formations here.

† "Melanotic cancer" has been, though very rarely, described in the pharyngeal region. The Malpighian layer of dermoid growths has been found to contain pigment, and this may have been the source. Such a lesion, where no pigment normally exists, can only be accounted for on that supposition; but its occurrence needs verification.

The lympho-carcinomata, and many even of the true sarcomata here met with, are the sequelæ of long-continued congestion of the mucous membrane, with its sub-mucosa. Thus, ordinary benign nasal polypi (adenomata) follow chronic catarrh, attacks of spasmodic asthma, *et iis similia*; these may ultimately become cancerous. If they consist wholly of connective-tissue, the result will be a sarcoma; or myxoma of the "mixed" species. If, as more commonly happens, the little tumour is a redundant overgrowth of "adenoid" tissue, a cancer of the first-named species is found. True carcinoma may occur, when the polypus is intrinsically a hypertrophied mucous gland; but is extremely rare.

Treatment.—Recognition of the particular species of cancer is of considerable significance in point of treatment, as also is accurate appreciation of their point of departure. True sarcomata present a much more favourable outlook than do the lympho-carcinomata and epithelial new-growths. Primary tumours within the antrum are less likely to "recur" after free extirpation than when that cavity is secondarily invaded from without.

The heroic, if ingenious, operations which have been devised for the two fortunately rare forms of malignant growth, known as "naso-pharyngeal polypus," seem to show an imperfect appreciation of the cancerous nature of that disease. They have seldom, if ever, conferred any benefit whatever, have often done much harm, and their omission from the usual text-books would be a distinct advantage. Thus, of 39 cases referred to in Mr. F. Treves' *Manual of Operative Surgery*, death followed the operation in 8; in 14 "recurrence" took place within the year; in 13 the result is unrecorded; only 4 are said to have been cured.

It is irrational to perform extensive resection of bony structures in debilitated subjects for infiltrating malignant growths, implicating the periosteum of the basilar process, and thus certain to reappear. After preliminary tracheotomy, burning away the tumour, or evulsion of this with free applications of the thermo-cautery to its base, best effect all that can be surgically done to check the fatal course of the malady.

CHAPTER VI.

CANCER OF THE GENITAL ORGANS.

I. *Female.*

Varieties.—At the vulva usually *Epithelioma*. *Melanotic* growths of this class occasionally occur. Malignant tumours of the connective-tissue series (*Spindle-sarcoma*, *Myxoma*) may be developed in the labia. The clitoris may be the seat of epithelioma. (See case with metastases in heart and lungs, Mr. H. Arnott, *Path. Trans.*, xxii.).

The vaginal mucous membrane may be attacked by *Epithelioma* at any part of its continuity; but that disease, owing to the frequency of slight excoriations or fissures, is most often found at the vulvar or uterine terminations of the canal. In exceptional instances, *Lympho-carcinomata* arise from the lymphoid tissues in the vaginal wall.

The cervix uteri is the most common site of cancer in the female genitals. The species may be *Epithelioma*, beginning in the stratified epithelium of the *portio vaginalis*, or in the transitional ditto at the external os. The great majority of cases, however, are *Carcinomata*, derived from the gland-follicles within the cervical canal. The relative frequency of the two neoplasms has not been accurately ascertained, and the pathological nature of the particular form of malignant disease is from ulcerative decomposition in advanced cases, commonly difficult to determine *post-mortem*. Dr. John Williams (*Harveian Lectures on Cancer of the Uterus*, 1886) cites eight examples of epithelioma against twenty-two of carcinoma; and this is probably a fairly correct ratio.

Cervical carcinomata, in their early stages of growth, are

found to consist of aberrant reproductions of the normal follicles (cylindrical slightly branched tubes, lined by short columnar epithelium). As with the hair-follicles in rodent ulcer, the tubes throw out bud-like processes into the surrounding sub-mucous tissue; these inosculate until the sub-mucous tract is permeated by irregularly shaped elongated tubules, lined by short columnar epithelium. Ulceration quickly supervenes, and results in an excavated ulcer, with hard livid edges and raw vascular base. In a certain number of instances a protuberant solid tumour, with ulcerated surface (false "cauliflower-excrescence"), precedes excavation. The infiltration extends in the sub-mucosa, downwards, towards the *os internum*; the deeper muscle-substance resists, and is more gradually eroded. The hyperæmia of cancer prevails in the neighbouring tissues. Dr. John Williams states that the posterior lip is more often attacked than the anterior. By the time a vaginal examination is ordinarily permitted it is seldom possible to recognise the starting-point of the disorder with any approach to accuracy.

Pathologically there appears to be considerable analogy between the reproduction of tubular gland-follicles in early uterine carcinoma, and that of the follicles of Lieberkühn in cylindroma (*q.v.*). But the gland-tubes of the cervical canal are somewhat branched, and approximate more to the acinar type of gland-structure; the columnar epithelium is short, and the new cells quickly lose all shape-resemblance to the old.* Lastly, the progress of the disease is much more acute than in cylindroma of the intestinal canal, and the tube-formation more speedily replaced by a heterogeneous and disorderly cell-infiltration in which neither branching canals nor columnar epithelial cells can be found.

Cancer arising within the uterine cavity is also *carcinoma*, derived from the gland-follicles of the endometrium.†

* For plate showing the transition of columnar epithelium (healthy) into round or oval cancer-cells, see Dr. John Williams' *Harveian Lectures on Uterine Cancer*, plate xi. fig. 2; and plate xiv. fig. 1. Plate xvi. of the same work shows reproduction of uterine follicles by a secondary deposit within the liver.

† See note at p. 151. In the *Proclivity of Women to Cancer*, at p. 13 *et seq.*, are discussed in detail those periodic cell-changes in the endometrium, which more than anything else explain the peculiar liability of the uterus to cancer.

Myo-sarcomata, somewhat rare, are developed from the non-striated muscle; usually of the body of the uterus, occasionally from its neck. Whether true sarcomata also here appear is uncertain.

In the broad ligaments and ovaries, both *Sarcomata* and *Myo-sarcomata* may occur.

Malignant tumours of the ovary are more commonly derived from its cell-constituents (*carcinoma*). They are almost always complicated with cyst-formation, and are prone to the *colloid* (*mucoid*) transformation. The cysts are lined by columnar epithelium, being practically but overgrown Graafian follicles* (Plate XIV.).

Cancerous tumours in the broad ligament, partake also of the cystic character of the ovarian. Reported generally as sarcomata, they commonly, if not invariably, own a vestigial source, ranking with *Blastoma* (*q.v.*). Rupture of the cysts into the peritoneal cavity results in multiple auto-inoculative grafts.

The Fallopian tubes develop *carcinoma*, from minute glands in their sub-mucous tissue. The growths are usually papillomatous or villous in form. (See typical instance by Mr. Alban Doran in the *Path. Trans.*, xxxix., with sequel in vol. xl.; the patient's age was forty-eight.)

According to Mr. Bland Sutton (*Obst. Society Trans.*, xxx.), the so-called "rugæ" are really glandular diverticula, whose function it is to secrete an albuminous material comparable to egg-albumen.

Age.—The uterus becomes liable to cancer at a slightly earlier period than the mamma.

Of 119 cases of uterine cancer, the earliest age was 27, the oldest 65; 34 occurred at ætat. 30–40; 49 at 40–50; 19 at 50–60 (Sibley). The average age was 43.28 years; contrasted with 48.6 years in mammary carcinoma, and 53 in *women* suffering from cancer of other parts: with an average of 53.3

* Many so-styled "ovarian cysts," particularly in the aged, are really cancerous, the malignant parenchyma being masked by the exaggerated cyst-formation. A very typical and instructive example of ovarian cancer is detailed at length by Mr. Shattock in the *Pathol. Trans.*, xl.

On the other hand, the embryonic source of ovarian cysts, in early life, is exemplified by Mr. Alban's Doran's case in a child of seven months (*ibid.* xl. p. 250). See also Appendix A.

years in *males* with cancer of the lip, with one of 47 in ditto of other regions.

Of 2270 cases by Gusserow, 2 occurred under the age of 20 (?); 81 at 20-30; 476 at 36-40; 771 at 40-50; 600 at 50-60; 258 at 60-70; 82 above 70 years.

Of 119 cases tabulated by Mr. Sibley, the youngest patient was 27, the oldest 65, the average being 43.28 years.

Cases of supposed uterine cancer at an early age require careful verification (see note, p. 234). During seventeen years at the Cancer Hospital, I have met with but a single instance in a youthful patient, who was twenty-seven, married; sufferers under thirty have been most exceptional. The trouble, toil, and care which ordinarily precede uterine cancer-development, operate as cancer-factors during the devolution-period of the organ—*i.e.*, from the age of thirty-four onwards, in average individuals, and not until functional activity is on the wane.

Influence of Marriage, &c.—The victims of uterine cancer are drawn mainly from the poorer classes, and married women show a very conspicuous preponderance over the single. Of 137 cases cited by Mr. Sibley (*Med.-Chir. Trans.*, xlii.), only 12 patients were spinsters. Of the 123 married, 26 were widows. With these figures contrast (*loc. cit.*) 315 women with cancer of all kinds, the uterus being included, of whom 55 were single.

The married women who are fertile appear hardly more liable to cancer than the barren. Of 100 married women with uterine cancer, 11 had not been pregnant. Of 180 with cancer elsewhere, 17 were sterile (Sibley).*

Of marital transmission, a possible example is narrated in the *Path. Trans.*, xix., by Mr. A. Bruce, but does not appear to be more than a casual coincidence. A man's wife died in 1863; she had suffered from cancer of the uterus for "many years" (*sic*). In the following year a wart grew on the husband's prepuce, which developed into epithelioma. Considering the facilities for cancer inoculation which Nature continuously

* As many cases date from parturition, or a miscarriage, this inference must be accepted with some reserve. Gusserow finds an average of 5.1 children to every case of carcinoma.

affords, the absence of even such dubious instances as the foregoing is highly significant, in its bearing upon the *microbic* hypothesis.

I have never met with any even possible example of cancer-transference by the genital tract. The three cases of consecutive development noted at p. 8 were as follows. A publican died, in August 1886, of lympho-carcinoma in the cervical glands. His wife after repeated visits to my out-patient room, where she always exhibited continuous dread of a like fate, was found, in March 1891, to have developed a breast-scirrhus. A gentleman, for years mentally deranged, suddenly manifested symptoms of intestinal obstruction, and was found, after death in September 1889, to be suffering from a cylindroma of the sigmoid flexure; his wife succumbed to uterine carcinoma in December 1891. A woman died from the last-named in May 1891; her husband, who had declined an operation for epithelioma of the tongue, died in Switzerland, four years previously.

Causes.—Of *vulvar* epithelioma, the continuous irritation of a pre-existent fissure, excoriation, wart, &c. In *vaginal* and *cervical epithelioma*, such a development is favoured by too early abandonment of the recumbent position after parturition; by consequent too speedy resumption of conjugal functions; by the frequency of lacerations received during childbirth, the persistence of unhealthy discharges, &c.

Of *uterine carcinoma*, unhappily one of the most frequent forms of the cancer-process, the most common source is mental distress and worry. The close subordination of the functions of the lining membrane, both of uterus and cervix, to the central nervous system, with the varying conditions of the circulation which these involve, and the continuous modifications of cell-growth on which they depend, account for the sequence.

A few cases follow sudden injury, as by a fall; a considerable number date from a confinement with its consequent traumatism. In exceptional instances, as in one noted by Dr. John Williams, the mechanical irritation of a polypus has ended in carcinoma. The very considerable frequency with which so-called "ulceration of the womb" affects civilised women is significant. Like certain tumours, both of the breasts and uterus, this malady is largely attributable to the interference of the corset with the natural processes of evolution, involution, or devolution. In itself devoid of gravity, it maintains a persistent unhealthy

state of the part, prone to end in cancer as age advances (see further remarks on p. 264).

Myo-sarcomata commonly arise from an antecedent benign myoma; and it is probable that some malignant conditions of the uterine appendages are examples of a similar sequence. Many cancers in the internal pelvic organs follow a blow or fall; others date from a period of severe illness, of mental distress, of harassing exertion, and the like.

Symptoms and Diagnosis.—Malignant growths on the external genitals present similar characters to the corresponding diseases elsewhere. Those of the *uterine appendages* constitute tumours growing with variable rapidity; sometimes of stony hardness, solid and firm; at other times wholly cystic in outward semblance; very often presenting an admixture of the two conditions.

Carcinoma and epithelioma of the uterine *cervix* commence with identical symptoms, progressively increasing *pain* and *debility*, accompanied by an *offensive vaginal discharge*. The pain is referred to the lumbar region, and extends down the thighs; it is a continuous ache. The vaginal discharge is sanious, semi-purulent; there are occasional attacks of more or less severe *hæmorrhage*, particularly in the later stages, or when the patient still menstruates. Subsequently to the climacteric, there may be little or no "loss" until an advanced period of development.

Vaginal examination reveals the existence of either a *solid fungous protuberance* or an *excavated ulcer*. The former may grow into a large roundish mass, filling and distending the whole vaginal canal, and constituting false "cauliflower excrescence." This may slough away *en masse*, giving place to the next condition. Ordinarily it undergoes gradual erosion, the surrounding parts becoming infiltrated simultaneously.

Much more often when the first examination takes place we encounter an *excavated ulcer*, with hard, irregular livid edges, bleeding when touched. Seen through the speculum, it presents the usual appearances of an epitheliomatous or of a chronic carcinomatous sore. But such a proceeding is barbarous, and rarely adds to our knowledge. Digital exploration amply suffices for diagnostic purposes in average instances.

With the significant item of *previous exposure to an exciting cause of cancer* (mental distress, recent parturition, or miscarriage, &c.) are found the symptoms above detailed—pain, fetid discharge, progressive weakness, attacks of hæmorrhage at abnormal periods. A vaginal examination will nearly always render the diagnosis clear. Care must be taken that *simple hypertrophy of the cervix* combined with an irritable condition of its gland-structures be not mistaken for malignant disease, an error which may readily happen in unpractised hands. The whole cervix, besides being greatly thickened, is covered by minute granulations; there is profuse vaginal discharge, which, if neglected, may become offensive. There may be slight bleeding when the part is touched; the menstrual flow is much exaggerated, with consequent anæmia and debility; to the finger, the surface of the *portio vaginalis* seems everywhere ulcerated; there may or may not be concomitant “granular erosion” at the orifice.

Distinguishing such a condition from cancer, the following points may be noted. The patient is often young, far below the average cancer-age; the cervix is soft, without that almost constant marginal hardness which denotes a malignant deposit; foetor is absent, or only casually present. The disorder dates from parturition or miscarriage, at least in the most typical instances; sometimes pregnancy exists. The symptoms are non-progressive; there is the usual “back-ache” of non-cancerous uterine ailments, far less severe than the lumbar pain of cancer, and alleviated by rest.*

The very common “ulceration of the womb,” otherwise

* I have more than once known the uterine cervix as above affected, excised in mistake for cancerous disease. A patient's youth should always hint caution. The following instance of what may be termed “masked” internal cancer is instructive. A middle-aged woman, very stout, healthy-looking, applied to me in October 1891 for enormous brawny œdema of the right leg and thigh, simulating elephantiasis. She felt no pain whatever, knew of no tumour, made no complaint of vaginal hæmorrhage or discharge. Upon admission to the hospital, a large mass, previously disguised by her obesity, was found in the right broad ligament; and a vaginal examination proved that this was secondary to cervical carcinoma of the usual type. I have encountered several others (without the œdema) in which advice was sought for a supposed ovarian tumour, no reference being made to the cervical disease which constituted the primary lesion.

"granular erosion," consists in a slight extroversion of the intra-cervical mucous membrane, with some hypertrophy of this, and of the gland-follicles it contains. It presents none of the usual objective cancer-phenomena, hardness, fetid discharge, hæmorrhage; and cannot well be mistaken for that disease. A consequence and certain evidence of chronic congestive conditions, this prevalent malady of the civilised female must necessarily predispose to eventual cancer-developments.

Higher up in the cervical *canal*, carcinomata may commence with prolonged and continuous hæmorrhage, all other cancer symptoms being absent. Of such was the case (cured by caustic applications) cited at p. 96 of *The Re-appearance of Cancer*. Soon, however, a tumour distends the external *os*, with concomitant pain and profuse discharge from the irritated Nabothian follicles. The latter may not become fetid until the disease has made considerable progress. The symptoms gradually pass into those above detailed.

Carcinomata beginning within the uterine *cavity* are necessarily more difficult of recognition than the cervical, and more apt to be mistaken for non-malignant maladies. The *age* of the patient and the pre-existence of an adequate *exciting cause*, are the two diagnostic elements to be first regarded. There is DISCHARGE, fetid, sanious, much more scanty than with cervical cancer; PAIN, aching, continuous, felt above the pubes, as well as in the loins; TENDERNESS ON PRESSURE, an obviously enlarged organ, occasional attacks of hæmorrhage, progressive debility, &c. Before certainty can be arrived at in an early stage, it is necessary to examine under anæsthesia, dilating the uterus by Hegar's or similar instruments. A non-malignant polypus, a sub-mucous fibroid, even sub-involution, or chronic endometritis, may cause precisely similar symptoms, including offensive discharge, to those of carcinoma; fœtor being readily induced by the decomposition of partially retained secretions.

True "*cauliflower excrescence*" consists in a villous or papillomatous growth from the margin of the external *os*. It would seem to be, occasionally at any rate, primarily non-malignant, being a hypertrophy of gland-follicles analogous to the mucous polypus. The parts, however, are extremely vascular, and if

not submitted to treatment, death rapidly follows from the profuse drain of blood-constituents. There are frequent attacks of hæmorrhage, and, in addition, there is a copious *watery* secretion from the overgrown follicles. It is seldom fetid until a late stage, and there is no pain. In the end, the soft bleeding pulpy mass commonly sloughs or ulcerates away, leaving an excavated ulcer, whose borders are infiltrated by malignant cells, and which does not then differ in characters or symptoms from ordinary carcinoma. Fairly young women are often sufferers.

Cancerous growths of the uterine *appendages* vary necessarily with their point of origin and pathological class. Some appear as rapidly progressive masses, of stony hardness, blending all the adjoining parts into a single knotty mass; these have sharply defined edges of irregular shape. Over the bulk of the tumour, infiltration of the sub-serous tissue by serum occasions a peculiar crepitant sensation to the touch.* Extreme emaciation and a sallow cachectic appearance are marked symptoms almost from the beginning.

Severe continuous pain is felt, and ascites eventually occurs. Metastases are found at various parts of the abdominal cavity. The disease is highly acute.

Other malignant tumours of these parts assume a more or less cystic character, and progress more slowly. They are less prone to metastatic deposits, and may prove fatal by their mere bulk and pressure-effects. Sooner or later ascites occur. The myo-sarcomata, solid, rounded, non-cystic, often permit six or seven years of life. They involve repeated attacks of vaginal hæmorrhage; their salient characteristics are pain, very persistent discharge of blood *per vaginam*, and progressive tumour-formation, with often a history of precedent benign myoma.

Ovarian dermoids, which by reason of the pain they involve might cause suspicion of cancer, are found in women under middle age, often in early youth or childhood (see p. 353).

In the case of cystic masses rupturing and discharging malignant cells into the peritoneal cavity, auto-inoculation very

* I have never found this physical sign associated with any other than a MALIGNANT growth.

readily takes place, and large metastatic tumours often grow from various regions of the serous membrane. These are generally referable to an ovary or broad ligament as their primary source. Many are associated with the colloid degeneration. (See Colloid Cancer.)

Treatment. — Epithelial cancer of the external genitals should be treated on general principles—*i.e.*, prompt extirpation of the primary growth, combined with that of the superficial lymph-glands in the corresponding groin—in both, if the disease is central. Small lesions may be removed with the knife; for large, eradication can be more effectively secured by transfixing with long needles, and passing under these the platinum wire of the galvanic *écraseur*. Paquelin's thermocautery may be used for small epitheliomata. The parts are necessarily exposed to risks of septic contamination, which the hard dry eschar left by a cauterising instrument efficiently precludes.

Removal of the *superficial inguinal* lymph-glands, previously to the enlargement stage, is the all-important point in preventing "recurrence." The group around the saphenous opening need careful examination, and should be also removed in case of any suspicious tenderness, or increase in bulk. These are usually infected next after the glands along Poupart's ligament; subsequently deposit takes place in the *deep inguinal* and the *pelvic*. Surgical interference with the latter cannot be recommended.

Epitheliomata of the *vaginal wall* permit excision only when small and recent. When, as most commonly is the case, the *cervix uteri* is found diseased, it is also best to decline operative treatment unless the lesion has been discovered soon after its inception, and is of very limited extent. Malignant growths of a year's duration rarely or never derive benefit commensurate to the risks incurred from any surgical procedure whatever, and even long before that date the prospects of cure will have become very small. The principal obstacle is the tendency of the cell-infiltration to extend from the external os in the sub-mucous connective-tissue of the vagina; and in any but a recent case it is difficult to excise a sufficient "invisible zone" of this tissue to preclude local reappearance. Within

the canal of the cervix the sub-mucous tissue is also more rapidly implicated than the muscular walls; it is accordingly requisite to sever this "infection-path" high above the part visibly diseased. Eventually secondary deposit takes place in the broad ligaments, pelvic or lumbar lymph-glands, liver, or other viscera. At the expiration of a twelvemonth from the commencement, the existence of such internal lesions is almost a matter of certainty.*

Given a long *portio vaginalis*, and an incipient cancerous ulcer, excision may be effected by the *galvanic éraseur*. Ordinarily, however, it is difficult thus to divide the cervical canal sufficiently high above the lesion, and removal by the scissors more satisfactorily attains that aim. The parts being exposed in the usual way, the mucous membrane must be divided around the cervix, at the reflection of the vaginal wall. Pushing up the higher part with finger or scissors used as a raspator, enables the cervix to be grasped with a vulsellum, and brought well down to the external orifice. By gradually working upwards in the same manner, without further incision, a still higher grasp can be taken with the vulsellum, until a sufficient distance above the palpably infected tissue has been attained. Manual pressure by an assistant above the pubes will sometimes aid this manœuvre, not easy when the uterine attachments are rigid and inelastic.

When the cervix is sufficiently exposed, it should be transversely severed, usually about the level of the *internal os*. It is generally possible to take up the blood-vessels by long curved Wells' forceps before the final division takes place. They should be subsequently ligatured with silk, catgut being apt to slip. For hæmorrhage otherwise uncontrollable, as when the bleeding vessels cannot be distinctly seen, *iron-lint* on stick sponges is of great service. It has, under exceptional circumstances, been found necessary to leave one or two of these for twenty-four hours as a plug, or for Wells' forceps to remain similarly *in situ*.

A metallic male bougie should be kept in the bladder during

* In Mr. Sibley's statistics, which apparently group together cases of cervical and of intra-uterine cancer, the disease was strictly localised in 15; the uterus and lymph-glands alone were implicated in 19; distant organs also, in 10. Total 44.

this operation; the upward curve of the instrument held by an assistant makes counter-traction against the cervix forcibly pulled downwards; accidental puncture of the former is thus prevented. It is requisite, in the first instance, the patient being placed in the usual position, to distend the vagina by anterior and posterior duck-billed specula. When the vulsellum has been introduced, the anterior may be removed. Later in the operation, vaginal retractors, with broad flat blades curved on a rather long stem at an acute angle of about 30° , are useful; they give more room than the ordinary duck-billed specula, wanting the curved prominent edges of these. They can also be applied laterally, with the handle held over the hips.

The peritoneum should not under ordinary circumstances be opened. Both previously and after operation, the most careful antiseptic precautions are needed. The catheter should be employed for the first three days, or even longer.

Two immediate risks are those of uncontrollable bleeding from some dark recess, with subsequent liability to pneumonia; secondly, the possibility of wounding the ureter in immediate contact with the cervix and upper part of vagina. Should it not be possible to grasp and ligature a severed vessel which cannot be seen distinctly, stick-sponges, enveloped in *iron-lint*, promptly arrest the bleeding, and enable the dangerous region to be clearly surveyed. There is little chance of injuring the ureter, provided that traction by the vulsellum be duly maintained, that the structures, when the mucous membrane is divided, are peeled off rather than cut, and that the bladder is kept well forward by the bougie within.*

It is unnecessary, for cancer of the cervix, to remove any part of the body of the uterus; still more to perform a complete hysterectomy. Even after the disease has been suffered to run its course unchecked—a protracted period of two or three years—very little ulceration is found above the internal os, and the sub-mucous tissue of the vagina is the part specially liable to secondary infection by means of its very abundant lymphatics and blood-vessels—hence to future “recurrence.” To take

* Of 136 cases in which the cervix was excised by Pawlik with the galvanic *écraseur*, 33 were reported in sound health at periods varying from 1 to 20 years after operation. Schröder recorded a cure, as proved by immunity at the end of two years, in 31 out of 105 (Dr. John Williams, *op. cit.*).

away the whole uterus for a malignant lesion of the cervix is like amputating at the shoulder-joint for disease of one finger.

Extirpation of the uterus *in toto* is demanded only by carcinoma arising within its cavity. The prospects of lasting immunity afterwards are considerably greater than with cervical cancer. The sub-mucous tissue of the vagina, which, whatever operation be undertaken, constitutes the most dangerous "infection-path," and the chief obstacle to a cure, in cases of cervical carcinoma, is rarely contaminated by purely intra-uterine disease. Even when allowed to run its natural course, the latter often does not descend below the *os internum*.

The thick muscular walls act as an inhibiting barrier, to prevent local diffusion; much as the laryngeal cartilages with "intrinsic" malignant disease of the larynx. Hence, there is no prospect of local "recurrence," and the pelvic lymph-glands or viscera are not attacked until a much later date than with the more common cervical disease. The chief impediment to a curative operation is the remoteness from observation of the endometrium, and the rarity with which the malady is recognised in an early stage. Should a suspicion arise, there is no difficulty in arriving at certainty, by rapid dilatation under anaesthesia.

The operation of complete hysterectomy resembles the partial in its preliminary steps. The bladder being kept well pushed upwards and forwards by a metallic (male) bougie, the cervix is dragged down by a vulsellum, and the mucous membrane of the vagina peeled off on its anterior aspect until the peritoneal cavity is opened, and the fundus brought into view. The body is then seized by the vulsellum, and the organ pulled forcibly downwards, being thus anteverted. On each side successively the broad ligament is seized by two long curved Wells' forceps, transfixed beneath the distal pair by a curved handled needle, armed with a silk ligature, and securely tied. It is then divided between the two pairs of forceps, and the uterus removed with the proximal forceps attached. The others are lastly taken off, and the edges of the peritoneal wound accurately sutured by chromicised catgut.*

* Dr. Braithwaite, who reports twelve cases of complete hysterectomy in the *Brit. Med. Journ.*, Feb. 13, 1892, prefers, as an average rule, to *retrovert* the uterus. Much depends on the flexibility of the uterine attachments.

During the first part of this major operation, the danger of wounding the ureters must be obviated in the same manner as with the minor. Should the former have been performed for cervical disease, it is requisite after the peritoneal cavity has been opened to guard against pushing the affected part upwards, for obvious reasons of sepsis. A drainage-tube acts as a foreign body, and is rarely needed; the continuous use of the catheter subsequently must be enjoined, and the upper part of the trunk slightly raised, so as to ensure natural drainage. No syringing should be permitted for forty-eight hours. Should the intestines descend during the operation, they must be held out of the way by a sponge on the usual holder. If it be not possible to suture the peritoneum, patients do very well without that measure, the vagina being plugged for forty-eight hours by tampons soaked in extract of *Pinus canadensis* diluted with glycerine.

After amputation of the cervix, reappearance within the lumen of the remaining cervical canal may be appropriately dealt with by a liberal application of the stick *potassa fusa*. My eight cases published in the *Med. Soc. Transactions*, viii. 304, demonstrate the freedom with which this powerful caustic must of necessity be applied to the uterine mucous membrane; owing to resistance by the muscular tissue. In Case I. the entire cervix as high as the *os internum*, was in three sittings obliterated by escharotics; for a rapidly recurring carcinomatous growth high within the cervical canal. The patient, operated on in 1889, has remained perfectly well until the present year (1892). For primary lesions in an early stage the potassa fusa may be thus resorted to, when the individual entertains an invincible repugnance to "the knife," groundlessly supposed to be the surgeon's usual resort; or when, from anæmia, &c., it appears desirable to eschew any cutting operation. In order to produce any lasting effect, it is necessary to continue the caustic application, not merely for a few minutes, as when skin lesions are in question, but for periods of time varying from half an hour to an hour. A large number of sticks held in suitable holders must be used, until the whole diseased tissue seems destroyed. The vaginal walls must meanwhile be carefully guarded by sponges soaked in water and frequently changed; progress being from time to time

gauged by the index-finger of the operator. Copious douching with water ultimately checks instantaneously the further action of the escharotic, and, with this, all subsequent pain.

Bromine, which has been somewhat extensively employed for cervical cancer, is a mild escharotic with no special advantages, and in every way inferior to the preceding.

The true "cauliflower excrescence" is best treated by applications of *crystallised iron perchloride*. The use of this salt was first advocated by the writer in the *Brit. Med. Journal*, May 21, 1887; see also *ibid.*, January 3, 1891. The excessive vascularity of the new-growth and the anæmia of the patient often renders no other surgical procedure possible; at intervals of a week, two or three lumps of the solid perchloride are passed well up the vagina, the orifice of the latter being protected by one or two tampons of cotton-wool soaked in olive oil; these are removed the next day, and the canal duly syringed. Three applications are generally enough to extirpate the largest mass of villous growth; after these, a clean ulcer remains, which can now be radically dealt with without risk—by the *potassa fusa*, or by excision of the cervix; even if nothing further be attempted, the profuse drain of blood-constituents is checked, and life materially prolonged.

Little advantage is gained by excision of the *spurious* "cauliflower excrescence"—fungous carcinomatous or epitheliomatous growth from the cervix. The patients do much better when well nursed, and kept under the influence of opium, than when subjected to the harass and anxiety of an operation.

The practice of "scraping" malignant uterine sores needs emphatic condemnation. No good purpose can possibly be served thereby, and the plan is opposed to all true principles of cancer treatment. Any irritation applied to actively growing cancer-parenchyma necessarily stimulates cell-proliferation, and goes far to shorten life. To the harm thus caused by indiscreet meddling must be added the nervous depression inseparable from anæsthesia, and from the idea of what the patient considers "an operation."

Under all conditions which forbid the hope of a radical extirpation, these unfortunate women are best treated by careful nursing, combined with the continued administration of *opium*.

or of *morphia*. The most generally useful vaginal injection is *chloralum* diluted with water in the proportion of 1 to 20; this is deodorant, styptic, and has a slight local anæsthetic influence. *Carbolic acid* is unsatisfactory, as too volatile. *Nitrate of silver* (gr. x ad ʒj) answers still better, but is rather costly. The same objection holds with *menthol*, which in very fetid cases may be prescribed (ʒj to the ounce of olive oil); a glass or metal syringe is necessary, india-rubber being spoilt by the oil. When there is great tendency to hæmorrhage, I have employed Dr. Bond's *cupralum* (15 grains to the ounce) with advantage. It is sometimes necessary to syringe with *liquor ferri perchloridi* (1 part to 3 of water); or to plug the vagina with *iron-lint*. For excoriation of the vulva, *unguent. cetacei* combined with a little *menthol*.

Some caution is needful in first prescribing opiates for a woman far advanced in the disease, who has not previously taken them. Renal disorder is a not infrequent sequel of uterine cancer, its mode of production being identical with that of the disorganisation consequent upon chronic urethral stricture. Cystic dilatation of a ureter, or of the pelvis of the kidney, are not rarely evident. It is advisable to test the urine as a preliminary, and to administer minute doses of an opiate combined with a diuretic, until tolerance becomes established. *Antipyrine* is useful in this condition.

Attacks of severe *pyrexia* during the later months indicate pus burrowing in the sub-peritoneal connective-tissue of the pelvis. They may produce symptoms temporarily alarming: a brown tongue, sordes, delirium, and prostration, but often yield speedily to rest in bed and hot fomentations.

Vomiting, a common and troublesome symptom, is best combated by temporary diet restrictions, such as ice and barley-water, small frequent doses of champagne, &c. Medicinally, by a pill of *eucaïne hydrochlorate* (gr. $\frac{1}{2}$ to gr. 1) every four hours; or by 10-grain doses of *chloral hydrate* in camphor mixture, frequently repeated. An *aphthous* condition of the gums, &c., is a consequence of the wasting disease, and not of the *morphia* injected; it is promptly remedied by the usual topical applications.

The operative treatment (by laparotomy) of malignant

growths within the abdominal cavity does not differ in detail from that in vogue for non-malignant tumours. The cystic character of the former, and their unrestricted growth on a free surface, are conditions favourable to localisation, and so to the prospects of cure.

II. Male.

Varieties.—On the penis and scrotum *epithelioma* is the prevalent species; *melanotic cancer* and *sarcoma* are rare; growths of the latter class often contain cartilage (? *Blastoma*).

The testes are liable to *carcinoma* derived from their secreting epithelium; and to true *sarcoma*, arising either in the tunica albuginea or in the fibrous stroma.

Lympho-carcinoma (lympho-sarcoma) may commence in the inguinal lymph-glands, and secondarily invade the testes, cord, and scrotum.

It is at present impossible to ascertain the relative prevalence of carcinoma and sarcoma, in the external male organs. As the fully-developed testis is a secreting gland, there is an *à priori* presumption that cancerous growths, not of the vestigial class, will prove to be carcinoma. In his well-known work, Mr. Butlin tabulates twenty cases of carcinoma, against forty-one of sarcoma, round-celled, spindle-celled, and mixed-celled. As in the latter are included twenty-two of the dubious "round-celled sarcoma," taken mostly from foreign sources, the second item must be held liable to considerable deduction. Malignant tumours occurring in early childhood; as well as those at a later date which contain heterogeneous structures, cartilage or bone; need differentiation as a distinct group. (See "*Blastoma*," Appendix A.) As in the female, the relics of the mesonephros originate dermoids of the broad ligament and ovary; so in the youthful male, they prove the source of malignant tumours of the bladder, cord, and testes. A case of "*Recurrent Cystic Enchondroma of the Testicle*," with metastatic lung-deposit (*Path. Trans.*, xx.) by Mr. De Morgan, merits notice.

Three cases of "*Congenital or Early Sarcoma Testis*," at the ages of three, eight, and eleven months, are respectively reported by Messrs. Parker, Silcock, and Chaffey, in *ibid.* xxxvi.

The epididymis with the spermatic cord may likewise be attacked by *carcinoma*, or by *true sarcoma*. Commonly the patients are children, and the cancerous growths "*Blastomata*." A case of "*Spindle-celled Sarcoma of the Epididymis*," in a boy of four, is narrated by Mr. Eve (*Path. Trans.*, xxiii.). A

"Myxo-Chondro-Sarcoma" of the Spermatic Cord, by Mr. Pepper, is described in vol. xxxiii. ; with a second case, in which on both sides the testes and epididymes in a man, aged sixty-four, were replaced by masses of true bone, without admixture of cartilage.

Age.—Fifty-one cases of miscellaneous cancer in the testicle, by Ludlow (quoted in Curling's well-known monograph), appeared as follows :

Under the age of 5 years occurred 5 cases ; at *ætat.* 15-20, 1 ; at 20-30, 11 ; at 30-40, 22 ; at 40-50, 6 ; at 50-70, 6.

Causes.—Of epithelioma attacking the *penis* or *scrotum*, continued friction. Warts, congenital or acquired, old syphilitic lesions ; neglect of cleanliness ; in the case of the glans penis or prepuce ; unremedied phimosis, involving the retention of irritating secretion ; may be referred to as predisposing conditions. Of twelve patients, under Hey, with cancer of the penis, ten had phimosis, congenital or acquired. The formerly frequent occurrence of epithelioma on the scrotum of chimney-sweeps has given rise to the term "chimney-sweep's cancer." The conformation of the *cutis anserina* obviously favours the lodgment of "matter in the wrong place ;" the scant attention paid by the English working-classes to the cleanliness of the genital region will permit its long-continued retention : soot consists of very finely divided particles, chemically exercising a peculiarly irritant influence upon epidermic cells, mechanically capable of access to the follicular structures of the integument. Hence the malignant sequence ; which is now comparatively rare, on account of more cleanly habits in the class concerned.

Apart from its irritating effect upon epidermic cells in general, no specific or direct influence in the genesis of cancer can be attributed to the soot. That substance originates a wart ; and the wart, like similar growths elsewhere when subjected to further irritation, terminates in epithelioma. Sir James Paget (*Surgical Pathology*) remarked that the skin of the whole body in chimney-sweeps is dry, harsh, scaly, and studded with numerous warts. The fine division of the carbonaceous powder appears to be a material element, for coal-

dust has no such effect, colliery operatives being apparently exempt. So also is neglect; for the sweeps of Belgium, Holland, North Germany, and Switzerland, who wash themselves daily from head to foot, besides taking dress-precautions to obviate the lodgment of soot, are quite free from this disease. Crude paraffin, coal-tar, and other carbonaceous materials, are stated to act in the same manner as soot, a chemical element in the irritation process being thus indicated. Occasionally other parts than the scrotum are the seat. Some years ago a gardener was in the Cancer Hospital under my care with epithelioma on the wrist, which he attributed to contact with soot used for manure. A similar case is reported by Sir James Earle (edition of Pott's Works, iii. 182). Scrotal epithelioma is anything but rare in men who have not been brought in contact with any carbonaceous material. Except in its mode of causation, the chimney-sweep's disease in no way differs from ordinary epithelial cancer.*

In the testes and cord, cancers of any variety almost always result from *mechanical violence*. The etiology of the small and obscure vestigial group needs further investigation.

The lympho-carcinomata which attack the inguinal glands are the sequel of *blows* or of *muscular strain*.

Diagnosis.—The early recognition of epithelioma presents no special difficulty. That of less superficial cancerous disease will largely turn upon age and causation-history. A tumour-formation in the testis, appearing after a blow received by a man of forty upwards, and progressively enlarging, will almost assuredly prove cancer in one form or another.

In young persons, the early stages of cancer may be closely simulated by non-malignant affection. A history of *traumatism* on the one hand, or of previous *syphilisation* on the other, is significant. The physical appearance of the individual is of

* For literature of chimney-sweep's cancer, see three lectures by Mr. Butlin, *Brit. Med. Journ.*, June and July 1892. The author contends that this disease is as prevalent now as in former times. That opinion is at variance with the experience of most other English surgeons. At the Cancer Hospital, during the past seventeen years, I have encountered some twenty cases of epithelioma scroti, but not one in a sweep. For the effects of paraffin, see Ogston, *Edin. Med. Journ.*, 1871; Bell, *ibid.*, 1876; Volkmann, *Beiträge zur Chirurgie*, S. 370.

some consequence; a worn-looking debilitated man is much more likely to have become the subject of cancer than one robust and vigorous. It is generally the remote sequelæ of syphilis which bear the closest resemblance to a malignant development. Many so-called benign tumours of the testis (*chondromata*, *fibromata*, even *cysts*) are quasi-malignant, apt to reappear after excision, and in the end to assume indubitably malignant characters (note case at p. 72).

With malignant lesions, especially of the carcinomatous order, there is from the first rapidly progressive deterioration in the general health, pointing to the existence of grave organic disease. As these tumours are perfectly painless during the first few weeks, such a conspicuous falling-off in a man previously vigorous, is a valuable sign prior to the lymph-gland enlargement.

The objective symptom, "stony hardness," useful in the diagnosis of cancer elsewhere, is here unreliable. Depending on cell-growth under a resisting envelope, the phenomenon accompanies syphilitic or even tubercular deposits, under the tenacious *tunica albuginea*. The subjective "pain" is similarly untrustworthy, for a like reason. Should the fibrous investment of a malignant growth resist the advance of the proliferating cells, tension results, and pain is severe and continuous. If the *tunica albuginea* be readily eroded by acute carcinoma (encephaloid), the bulky mass is often productive of no suffering till an advanced stage. The *presence* of pain points strongly to cancer, but its *absence* does not constitute a negative.

Variations in the consistence of a solid tumour, some parts being hard, others soft and fluctuating, is suggestive of malignancy, but hardly more. It will seldom be evident in a cancerous growth until after considerable duration, depending partly on the resistance presented by the *tunica albuginea*, partly on degenerative processes within the cancer-parenchyma.

When the fibrous investments have completely yielded to a mass of rapidly growing cells, the whole may be uniformly soft and fluctuating, simulating hydrocele or hæmatocele. The absence of pain enhances the difficulties of diagnosis. From *hydrocele*, the malignant disease is distinguished by the absence

of transparency when examined in the usual manner; by the history and age; by the condition of the inguinal lymph-glands; by the state of the general health. From *hematocele*, by the history and age; above all, by the stationary condition of the non-malignant, by the steadily progressive character of the cancerous lesion.

Syphilis, especially in broken-down constitutions, is apt to simulate cancer, even to the fungous protrusion. In the aged, it may terminate in malignant disease. Syphilitic deposits vary like the latter in physical characteristics. There may be a general ovoid enlargement of the gland, or a single hard gumma, or a number of these scattered through the substance of the testis, rendering the whole bossy and nodular. There may be co-existent hydrocele; one or both organs may be affected; the epididymis is a frequent seat of disease. The absence of malignancy is indicated by the history of the case and the presence of syphilitic lesions elsewhere; by painlessness; by comparatively slight and unprogressive enlargement of the inguinal lymph-glands. A fungous protuberance is attended by what seems to be atrophy of the testis, the organ gradually merging into the granulation-mass; in cancer, all the tissues are quickly infiltrated, and growth in all directions is uniform. Lastly, cancer involves extreme hyperæmia of the neighbouring tissues, the distended skin becoming marbled by large dilated blood-vessels. In syphilis, there is no excessive vascularity.

Simple inflammatory enlargement of the testis will be recognised by its causation and recency.

In *tuberculosis*, the patient is generally youthful, and there are evidences of pulmonary or other mischief of the same class. There are hectic symptoms, and though a fungous protrusion may arise, there is no marked vascularity around. Growth is very slow and gradual; the lesions are painless; the inguinal lymph-glands will be slightly enlarged. Both testes are sooner or later implicated.

In malignant disease, growth is always steadily progressive. In carcinoma, the adjoining *lymph-glands* enlarge early, and subsequently continue to increase in bulk. In sarcoma, the inguinal glands are not distally infected *per* the lymphatics; they eventually are infiltrated and blend in a single ill-defined

mass, with the scrotum and adjoining integument. Unless there is evident infiltration by contiguity, the opposite testis is not implicated by either sarcoma or carcinoma.

Malignant growths in the cord or in an adjacent lymph-gland will be diagnosed on similar principles. The facilities which the parts afford for rapid extension indicate the necessity of a prompt exploratory incision for any progressive tumour consequent upon a blow or strain, particularly in an elderly individual.

Treatment.—For epithelioma on the penis, it is requisite to remove the organ, together with the superficial inguinal lymph-glands. When the *glans* is attacked, excision may take place in front of the scrotum, provided there is a sufficient margin and the lesion is recent. At a later stage, or when the hinder part of the organ is the seat, it is necessary to remove all the tissues down to the perinaeum. For a patient who has not reached old age, the operation devised by Mr. Pearce Gould, which permits concurrent castration, is best. Unless, however, the scrotum be extensively implicated, its complete division is unnecessarily severe, and the following operation, described by Dr. E. Harold Brown (*Brit. Med. Journal*, April 16, 1892), is to be preferred :

The patient being placed in the normal position, a free incision is made in the middle line of the perinaeum ; and the organ exposed by manipulation, until it can be hooked well in the wound by a finger passed around. It is now transfixed as low as possible by a straight needle, and temporarily ligatured by india-rubber. The urethra is dissected out for an inch, divided and brought down ; the corpora cavernosa are cut through just above the ligature. The anterior part of the penis, being pulled well forwards, is removed by a circular incision anterior to the scrotal raphe ; the cord in that position being subsequently closed separately. The vessels of the stump are tied, the rubber removed, and the needle withdrawn. The urethra is now slit up, and sewn to the margins of the perineal wound, which is then sutured.

When the scrotum is the primary site, a large area of surrounding integument will need removal. The superficial inguinal lymph-glands form the "infection-path" in each of the above instances ; the lower group around the saphenous opening are also sometimes attacked early. The glands along

Poupart's ligament should be carefully dissected out simultaneously with the scrotal operation, and careful attention paid to the condition of the remainder. Appreciable enlargement of the superficial will usually indicate deposit in the deep inguinal and pelvic; consequently that temporary immunity only can be anticipated.*

Sarcomata of the testis demand excision of the diseased organ, together with that of the spermatic cord, the various elements of which here constitute the primary "infection-path." The incision should reach from the external abdominal ring to the lowest point of the scrotum. The cord being exposed, should be pulled forcibly downwards, and being caught at the highest point by large Wells' forceps, must be there divided, or, if there be obvious infiltration, the cord should be carefully dissected out as high as the internal ring. The part attached to the testis, is next peeled out with the attached tumour. Before the Wells' forceps are removed, and retraction permitted, the vessels of the divided cord should be ligatured separately. *Chromicised catgut* is the best material for this purpose. The ordinary catgut is useful as a temporary hæmostatic, but no more, undergoing rapid absorption, and becoming relaxed within twelve hours. Silk should never be employed, or tedious suppuration will almost inevitably follow.

When there is infiltration of the integument, this must also be freely excised; with adjacent inguinal lymph-glands, should the tumour be large enough to have approached the groin, and so to have rendered possible direct implication of these latter organs.

In case of doubt as to the sarcomatous or carcinomatous nature of the growth, removal of the superficial inguinal lymph-glands, prior to enlargement, is a precautionary measure which adds little or nothing to the gravity of the operation.

Carcinomatous tumours involve similar surgical treatment;

* There would appear to be an impression abroad that gland-enlargement in the groin, consecutive to a malignant lesion of penis or scrotum, may be irritative only, and may subside after removal of the latter. This happened to a patient under my colleague, Dr. Marsden, many years ago; I have heard of no other instance. The chances are enormously in favour of the supposition that the enlargement, under such conditions, is due to actual deposit in these glands.

excision of the superficial inguinal lymph-glands, whether increased in size or not, as a matter of necessity. It is *always* necessary to dissect out the spermatic cord as high as the internal ring. The treatment is less hopeful than that of sarcoma.

Malignant tumours attacking the cord demand similar operative measures; the disease extends rapidly in both the upward and downward directions. Obvious infiltration of this structure as high as the inguinal canal, enlargement of the deep inguinal or pelvic lymph-glands, marked emaciation, deposits in the liver or other viscera, forbid operative treatment by the knife.

The galvanic *écraseur* will occasionally permit the removal of a "fungous" mass, with much temporary relief.

Failing the possibility of surgical extirpation, medicinal treatment on general principles is indicated.

CHAPTER VII.

THE LARYNX.—THE ALIMENTARY CANAL BELOW THE PHARYNX.

I. *The Larynx.*

Varieties.—The prevalent cancer species is *epithelioma*. The malignant products of the columnar-ciliated epithelium lining the laryngeal cavity do not appear to differ clinically or microscopically from such as commence in the squamous lining of the vocal cords and epiglottis.

A differentiation, well founded on clinical facts, has been established between malignant tumours within the cavity (*intrinsic*), and such as commence without (*extrinsic*). Tumours springing from the true vocal cords or below these, are of the former class; those which originate in the parts above, including the epiglottis, of the latter. The distinction is of most practical significance in the case of epithelial growths, to which class the majority belong.

Extrinsic epitheliomata display the local diffusion, and the early lymph-gland infection, which characterise that species upon other mucous membranes, whenever the invading cells gain free access to the deeper tissues. On the other hand, the intrinsic are developed in proximity to a highly resisting material, cartilage: their local extension can take place, for the most part, only in the thin stratum of *sub-mucosa*. Hence, intrinsic epithelial neoplasms run a more chronic course than extrinsic; they do not so rapidly invade the adjacent glands, and the prospects of surgical interference are proportionately more hopeful.

Sarcomata (spindle-celled) may be developed from the connective-tissue, particularly from that in the vocal cords and epiglottis.

Lympho-carcinomata, arising from the lymph-follicles or diffused "adenoid" tissue most abundant in the ventricle, are not uncommon, though they probably often pass as "round-celled sarcoma."

The mucous glands may develop *carcinoma*, recorded under the same title, and extremely rare.

Causes.—Identical with those of epithelioma elsewhere; casual breaches of surface, aided by chronic congestion of the mucous membrane, or a chronically unhealthy state of its epithelium due to any source whatever.

The parts which develop extrinsic morbid growths are liable to scratches by the ingesta, such as fish-bones accidentally swallowed; or to burns by overheated articles of food; &c. Those which are *intrinsic* are shielded from direct injury in this way, but are liable to various catarrhal and congestive conditions; and to warty outgrowths, the result thereof. The classical case of the late German Emperor may be plausibly ascribed to undue vocal exertion in shouting military orders. A more recent example, in the person of the late Mr. Montagu Williams, was attributed to a like source. Old *syphilitic* lesions and chronic *alcoholic* congestion, as familiarly evidenced by the husky voice of the street-hawker, often account for the cancerous outbreak.

Sex.—Mr. Butlin (*Malignant Diseases of the Larynx*) quotes forty cases in men against ten in females.

Age.—Of fifty patients tabulated by the same author, 15 were *ætat.* 51–60 years; 10 *ætat.* 61–70; 8, 41–50; 6, 31–40; 4, 28–30; 2, 71–76; 1 *ætat.* 3 years; 4 age unrecorded. The single juvenile case suggests a vestigial origin.

Symptoms.—Of *extrinsic* epithelioma, local uneasy sensations passing eventually into pain of a burning character and aggravated by deglutition, form the initial symptoms. Later, there is hoarseness, subsequently passing into complete aphonia; hacking cough; expectoration, first of frothy mucous, later on of sanious, matter; neuralgic darts of pain into the ear; marked emaciation, and failure in general health. Enlargement of

both the superficial and deep cervical glands in contact with the larynx takes place very speedily.

Of *intrinsic* epitheliomata, similar cough, harshness, pain, expectoration, emaciation, and weakness. The symptoms generally less acute than in extrinsic; *not* aggravated by deglutition till a later stage. Less marked early failure in physical vigour; lymph-gland implication more remote; the neuralgic ear-pains long absent.

A *sarcomatous* tumour painlessly grows, and produces symptoms corresponding to its situation and bulk. The extrinsic interfere with deglutition and phonation, the intrinsic with phonation only. There is no semi-purulent sanious expectoration, but constant hacking, coughing, and discharge of frothy mucus. The lymph-glands do not enlarge unless directly invaded.

Lympho-carcinomata or *carcinomata*, also differ markedly from epithelioma, in the *absence of pain* until a late stage. The tumours grow rapidly as prominent or pendulous polypoid masses, producing cough, paroxysms of dyspnoea, hoarseness or complete aphonia. There is a frothy mucous expectoration, ultimately sanious or streaked with blood. The general health is manifestly undermined. As the cell-growth is free and on a free surface, the lymph-glands are not implicated so early as when these conditions are absent.

Diagnosis will be mainly based upon the results of a laryngoscopic examination, in addition to the symptoms recorded.

The practice of snipping off a minute piece by cutting forceps for microscopic examination is often resorted to, when a morbid growth is found in the larynx. The case of the Emperor Frederick proves that this step, valuable as *positive* proof of malignancy, is unreliable as *negative* evidence. Inferences based thereon should always be weighed in the light of *à priori* probabilities, such as those afforded by very persistent laryngeal symptoms, including sanious or bloody expectoration, in an individual of the cancer-age. A papilloma growing from a vocal cord, which at the age of twenty may be diagnosed as a benign wart, at that of fifty is an actual or potential epithelioma certain to become cancerous sooner or later.

Operative Treatment.—So far the results of what may be

termed "heroic" surgery for malignant laryngeal disease have proved extremely discouraging, and the greater part of these procedures fall under the ban elsewhere pronounced upon grave operations for advanced cancer. Apart from immediate risks, such as hæmorrhage and shock, there is considerable subsequent danger of septicæmia and pneumonia. The majority of the cases have succumbed within a brief period after the operation. A very large proportion of the remainder have quickly evinced "recurrence"; very few have been permanently cured.

Partial or total extirpations of the larynx have proved necessarily more successful in true *sarcoma* than in epithelioma, or lympho-carcinoma, and should be almost exclusively reserved for that form of cancerous growth.

In *extrinsic* epitheliomata, operative interference is almost invariably out of the question, *ab initio*. There is rapid infiltration of the sub-mucous tissue, extending into the pharynx, and the lymph-glands are usually enlarged before a diagnosis is effected.

For *intrinsic* laryngeal growths of the malignant class, epitheliomatous or otherwise, a preliminary tracheotomy should be performed, and a tampon-cannula inserted. The laryngeal cartilages should then be freely incised in the middle line, and the infiltrated tissue, together with a sufficient margin of the *sub-mucosa*, extirpated with the thermo-cautery. When there is obvious implication of the perichondrium, it is necessary to dissect out the cartilage, wholly or in part, according to the site of the lesion.

In selecting an operation, by which a cure may be hoped for, preference must be given to such measures as will afford the most free access. It is impossible to effectually extirpate tissue infiltrated by malignant cells, by an extra-laryngeal method. Nor is it advisable to "scrape" an epithelial ulcer, unless that step be followed up by free employment of the actual cautery.

Failing complete removal, an early tracheotomy will aid in prolonging life to two or three years in average cases. Should the general health be conspicuously impaired, it is best not to attempt any more severe operative treatment, but to rely upon the conservative powers of opium, internally administered by

the pipe or otherwise. The direct application of morphia (as by insufflated powders) is painful and irritating.

For topical anæsthetic agents, a useful formula is as follows:—*Chloroform*, *carbolic acid*, $\text{aa } \frac{1}{2} \text{ oz.}$; *rectified spirits of wine*, $2\frac{1}{2} \text{ oz.}$ Mix. One to two teaspoonfuls, mingled with a little warm water, to be used by Siegler's steam-spray inhaler at each sitting; several times a day.

Menthol dissolved in *paroleine* (1 to 16), and *carbolic acid* in the same solvent (1 to 19), may be employed by means of Burroughs and Wellcome's ointment-atomizer.

Cucaine hydrochlorate, in lozenges or by spray-apparatus, allays the pain produced by the movements of deglutition in extrinsic epithelioma.

II. *The Alimentary Canal below the Pharynx.*

Species.—The œsophagus is specially prone to *epithelioma*. In rare instances, *carcinoma* may be developed from the mucous glands, most numerous around the cardiac orifice of the stomach. *Myo-sarcoma*, and even true *sarcoma*, may occur as pathological curiosities.

The stomach is especially liable to *cyhindroma* (reproduction of peptic follicles), which is most often found at its pyloric extremity, but may attack any part of the mucous membrane. The cardiac orifice may be invaded by *epithelioma* commencing in the squamous epithelium of the œsophagus. *Lympho-carcinomata* derived from the lymph-follicles are occasionally found. The latter gives rise to tumour-formation, prominent bulky cell-masses. The two former appear as diffuse infiltrations of the mucous and sub-mucous tissues, with great thickening of the part, ulceration, puckering and contraction.

In the intestines, small and large, *cyhindroma* is also the prevalent species. The disease is usually ulcerative, infiltrating, and chronic; involving occasional attacks of local peritonitis, with the formation of adhesions. The latter subsequently contract, and extreme displacement may ensue. Thus, the duodenum or jejunum may be found dragged down into the pelvis, and blended with some part of the rectum in a single inextricable mass. The hard gritty character of the knotty

tumour thus constituted formerly caused these cases to be recorded as "scirrhus cancer."

Occasionally "fungous protuberance" is found, in place of the usual excavated ulcer. The tumours form soft polypoid masses, somewhat pedunculated, with little surrounding hardness. At a later period, this stage is succeeded by one of excavation, the exuberant granulations being removed by sphacelus.

Lympho-carcinoma not infrequently springs from the numerous lymph-follicles, or from the diffused "adenoid" tissue. The tumours are rapidly-growing, soft, exuberant.

Occasionally *sarcomata* have been found, most often in the rectum. It is possible that some of these originated rather in the muscle-fibre (*myo-sarcoma*); others in vestigial remnants; the rectum being a not uncommon seat of "dermoid" tumours.

The rectum may be the seat of *epithelioma*, commencing at the cutaneous margin of the anus, generally at the junction of skin with mucous membrane.

Rectal cylindromata are prone to mucoid degeneration, upon a more or less extensive scale; those of the stomach and intestines exhibit the same tendency, in a less conspicuous degree. The most marked examples have been described as *colloid cancer*.

Causes.—Of oesophageal epithelioma, the agencies already referred to in connection with epithelioma of other parts. In addition, the accidental or purposive swallowing of scalding water, or of powerful corrosives, may indirectly lead to cancer. A simple stricture results, which ultimately develops epithelioma; partly in consequence of the irritation following a narrowing of the lumen, partly by reason of tendency in the cicatricial tissue to cracks and fissures, slow to heal.

Cylindroma is practically a sub-variety of the former, owning a similar mode of causation. The causes of gastric and intestinal lesions of this class, though less open to observation, are doubtless similar to those of epithelioma. Malignant lesions of the rectum (their most common seat) are naturally favoured by the prevalence under modern civilised conditions of chronic congestion in the lining membrane. Piles, alcoholism, syphilis, habitual constipation, the lodgment here of

fish-bones, or other hard substances, may be pointed out as usual antecedents.

The influence of *mental distress*, and similar neurotic conditions, is marked, though it is impossible to gauge precisely their familiar action upon the alimentary tract. The unhealthy state of the mucous membrane which attends worry, overwork, loss of sleep, exhausting illness of any kind, strongly predisposes to malignancy by preventing the repair of casual lesions. Hence a history of such antecedents is common.*

Sex.—Males are much more liable than females to cancer of the œsophagus and stomach. The disproportion, however, is not so great as in the case of the lips, mouth, tongue, and pharynx. Mr. Bowreman Jessett (*Cancer of the Alimentary Tract*) cites 25 cases of pharyngeal and œsophageal cancer in men, against 10 in women. Of primary cancer of the stomach, Dr. Habershon has collected 52 in men, 22 in women; Dr. Brinton, 151 in men, 72 in women; Dr. Wilson Fox, 680 in men, 623 in women; Dr. Welch, of New York, 1233 in men, 981 in women.

In the alimentary canal below the stomach only a very slight disproportion between the sexes appears to exist. Mr. Jessett quotes 46 men with malignant disease of the intestines above the rectum, against 58 women; 20 cases of rectal cancer in males, 22 in females.

It is impossible to explain the extreme disparity between men and women to malignant developments in the upper regions of the alimentary canal by any structural or functional peculiarity of the parts concerned in the two sexes. The phenomena must be referred to some cause operating from without; not to any inherent idiosyncrasy. The male habit of alcoholic indulgence, particularly in the matter of ardent spirits, has been advanced in explanation of the predominance

* In this connection it is worthy of remembrance that Napoleon, at St. Helena, died of pyloric carcinoma. Dr. Dabbs, quoted in Mr. Jessett's work on *Cancer of the Alimentary Tract*, p. 4, records the following. "A widower, clergyman, residing with his two maiden sisters, retired from all work on a competency, suddenly lost all that competency, and his sisters' capital also. Within a year and two months all these were dead; the clergyman of a malignant nasal growth; one sister of cancer of the breast, the other of cancer of the stomach."

of that sex in cancer of the mouth, pharynx, and stomach; local causes can alone account for sexual disparities here. As below the stomach the mucous surface is no longer exposed to direct contact with alcohol, men and women are nearly equally liable to cancer of this region.

Site.—The œsophagus is specially prone to cancer at its junction with the pharynx opposite to the cricoid cartilage and the fifth cervical vertebra. Less often, the middle part, corresponding to the root of the lung and the bifurcation of the trachea, is the starting-point of disease; and the cardiac extremity ranks last. These three are the spots at which the morsels of food encounter obstruction in their descent.*

Of 1848 cases of gastric cancer collated by Mr. Jessett (*op. cit.*), the *pylorus* was attacked in 1110, the *lesser curvature* in 197, the *cardia* in 158, the *greater curvature* in 48.

Of 154 cases of intestinal cancer (excluding the rectum), the same author refers 42 to the *sigmoid flexure*, 33 to the *small intestine*, 30 to the *transverse colon*, 20 to the *cæcum*, 11 to the *descending colon*, 9 to the *ileo-cæcal valve*, 6 to the *ascending colon*, 3 to the *vermiform appendix*.

In the rectum, the most ordinary site is two to three inches above the anus. The localisation is explained by the ampullary dilatation (rectal pouch) of the bowel, involving retention in this particular portion of foreign bodies, as also of hard scybalæ.

The late Dr. Brinton (*Med.-Chirurgical Review*) usefully contrasts the sites relatively effected by cancerous and by non-cancerous ulcers of the stomach. Of 343 cancers, 219 attacked the *pylorus*, 38 the *lesser curvature*, 36 the *cardiac end*, 11 the *greater curvature*, 11 the *anterior surface*, 4 the *middle*; of 13 the precise point of origin was undecided. Of 358 simple ulcers, 177 appeared on the *posterior surface*, 52

* Statistics on this point are unreliable, on account of the varying inclusion, by different authors, of cancers in the pharynx at one end, of the stomach on the other, among cancerous developments of the œsophagus. Habershon (*Diseases of the Abdomen*) quotes 74 cases; in 33 the upper part of the tube was attacked, in 30 the middle, only in 10 the *cardia*. It may be doubted whether these ratios are accurate. In 13 the trachea was perforated.

at the pylorus, 98 on the lesser curvature, 18 on the anterior surface, 8 on the greater curvature, 5 at the cardia.

Age.—Of 85 cases of cancer in the pharynx and œsophagus, cited by Habershon, 59 male, 26 female; the average age of the males was $50\frac{1}{2}$ years, of the females $44\frac{1}{2}$.

One man was 30 years of age; 5 between 38-40; 14, 45-50; 14, 50-60; 19, 60-70; 4, ætat. 70-75; total 57 (with age recorded). Of 25 women, 1 was between 30-40; 4 ætat. 40-50; 8, 50-60; 2, 60-70.

In the stomach, the average age of 223 cases by Brinton was 51 years in men, $40\frac{1}{2}$ in women; 151 of these were male, 72 female. Under the age of 20 years, 1 case occurred; between 20-30, 2; 30-40, 10; 40-50, 17; 50-60, 24; 60-70, 18; 70-80, 2; total 74. Compare with 63 cases of *simple ulcer* by the same authority: under 20, none; 20-30, 14; 30-40, 18; 40-50, 6; 50-60, 15; 60-70, 8; 70-80, 2.

Seeing the numbers in old people, it may be presumed that some of these "simple ulcers" were really cancerous. *Per contra*, cancer cases in the young must be received with hesitancy.

Of 13 cases of cancer attacking the ascending or transverse colon, collected by Dr. Fordyce Barker (*New York Med. Journal*, 37, 1883), all occurred after the age of 60.

Of 41 cases of rectal cancer, tabulated by Mr. Jessett (*op. cit.*), 2 occurred under the age of 20, being in males of 15 and 17 years respectively; at ætat. 20-30, 2; 30-40, 6; 40-50, 8; 50-60; 7; 60-70, 13; 70-80, 3.

Symptoms and Diagnosis.—Cancer in any part of the alimentary tract below the pharynx follows the usual rule of development. The sufferers are old or well advanced in middle age; were previously well worn, or altogether broken-down in health.

In *œsophageal* epithelioma, the first symptom is slight soreness on deglutition, referred to a spot behind the cricoid cartilage; there is also tenderness on pressure at this point; laryngeal irritation, cough, hawking and spitting are often present in slight degree. Later, a localised induration, with burning pain, appears. There is distinct obstruction; with

the stethoscope a peculiar gurgling is audible at the spot. Rapid emaciation and marked muscular weakness follow, both altogether disproportionate to the degree of obstruction and actual extent of the lesion. The neighbouring deep cervical glands, on one or on both sides of the canal, quickly enlarge, and a distinct tumour can be recognised. When the cardiac end of the canal is first attacked, there will be severe continuous pain in the middle line of the back between the shoulders, and the pleura eventually becomes implicated.

The passage of the œsophageal tube for diagnostic purposes is dangerous and unnecessary, and the same remark holds good in respect of the ingenious plan of intra-thoracic auscultation lately promulgated by Dr. W. B. Richardson (*Lancet*, Nov. 12, 1892).

When the pyloric orifice of the *stomach* develops cancer, the symptoms of chronic dyspepsia gradually pass into those of obstruction; a hard tumour, tender on pressure, can be felt; the organ becomes greatly dilated, and attacks of vomiting ensue. These may be accompanied by sarcinæ, and may occur at regular intervals after food. Should the body of the organ be attacked, the vomiting is irregular; sometimes "coffee-ground" in character, and accompanied by tarry evacuations (*melæna*); sometimes taking place only once in several days, sometimes several times daily. It may even be wholly absent, particularly should the lesion be situated on the lesser curvature, or should there be concomitant mental derangement (case by Dr. Murchison, *Path. Trans.*, xix.).

Marked tenderness on firm pressure is a valuable sign of malignancy in a suspicious abdominal tumour. I have never found it wanting in cancer. It is particularly useful in distinguishing the latter from fecal accumulations, the subjects of which are old and worn-out with an emaciated "cachectic" appearance, often closely simulating that of the cancer-patient.

Cancer of the *intestines above the rectum* is often insidious in its course and obscure in its phenomena, particularly if the patient's intellect be affected. The most suspicious symptom is *chronic diarrhœa in an aged person*; a complaint of frequent intestinal evacuations without obvious cause, should suggest the presence of malignancy. With this may be *colicky pains*

in the abdomen; *anorexia*; a general sense of *malaise*; and often, but not invariably, *progressive emaciation*. On palpation, an ill-defined induration, tender on pressure, will probably be detected. The sites most often attacked by cylindroma, and to which therefore attention should first be directed, are the *sigmoid flexure* and the neighbourhood of the *ileo-cæcal valve*.

Commonly there are *pain* or uneasy sensations referred to the spot. But the freely growing polypoid tumours, as lympho-carcinoma, may produce no suffering until large enough to obstruct the lumen, and, in exceptional instances, cylindromatous infiltrations may be similarly insidious. There may be no emaciation; *per contra*, obesity may prevail, when the tumid abdomen disguises to the last the presence of a tumour. *Diarrhoea* and *constipation* may alternate. In old people, the first may long pass without notice, and *complete obstruction* may be the first symptom for which medical advice is sought. *Melæna*, or sometimes evacuation of arterial blood, may take place, but is not common in intestinal cancer.

Impacted feces may be mistaken for cancer. The masses are doughy; painless on deep pressure; readily dislodged by a copious enema. They are often attended by chronic diarrhoea. There may be several at various parts of the abdomen, simulating in some degree multiple deposits of cancer within the peritoneal cavity, but easily differentiated on the above grounds.

Malignant disease of the *rectum*, when arising high up within that canal, is often similarly obscure and insidious. The symptoms tally with those of the higher intestines; the patient may be unable to localise the uneasy sensations. Chronic looseness of the evacuations should lead to exploration by the finger. If no deposit can then be detected, examination under *anæsthesia* is essential.

When the lower part of the rectum is attacked, there is continuous aching in the loins and pelvic regions, with local sensations of heat and burning. Scanty evacuations, often described as "diarrhoea," of liquid feces, fetid, sometimes streaked with blood, take place several times daily. Defecation is attended by straining efforts, and if the sphincter is implicated, there will be an involuntary muco-purulent discharge.

Later, the patient becomes emaciated, and the complexion may assume a peculiar leaden hue, pathognomonic of grave intestinal disease.*

Complete obstruction is much more frequently met with in malignant disease attacking the *upper* part of the rectum than when the *lower* is the site.

Polypoid or fungous growth may accompany the development of cylindroma. Lympho-carcinomata and true sarcomata may be met with as pendulous tumours. A polypus in the rectum, non-malignant or otherwise, acts as a valve, causing intolerable suffering by continuous attempts at defecation.

Ischio-rectal abscesses not infrequently attend malignant disease near the anus. Their appearance should always suggest a digital exploration, and the elimination of a possible mechanical cause.†

Duration.—Malignant disease of the œsophagus proves speedily fatal by various means. Of 566 cases tabulated by Dr. D. Newman (*Lancet*, January 30, 1892), death resulted from *collapse and exhaustion* in 390; from *pneumonia or gangrene of the lungs* in 91; from *pleurisy* in 53; *peritonitis* in 17; *perforation of heart or blood-vessels*, 15.

Cancer of the stomach proves fatal in about two years. Disease of the intestines above the rectum permits a few months' longer tenure of life.

In the rectum we find an exceptionally chronic career, protracted sometimes ten to fifteen years. Provided the canal remains patent, the functions of this part of the bowel are non-essential to life, and metastatic deposits ensue but slowly.

Treatment.—In œsophageal cancer, *opium* will do most to check the advances of the disease and prolong life. The drug

* The ghastly corpse-like aspect of a person who has sustained rupture of the intestines, may be noted in this connection.

† Rectal malignant lesions are occasionally insidious. In the *Brit. Med. Journ.*, April 23, 1892, is reported (by Dr. Little) the case of a man who had made no complaint of any rectal symptoms during life, yet was found at the autopsy to have extensive disease of that part, together with a huge metastatic deposit in the liver. It is probable that the rectum, thus affected, is often overlooked, at hasty post-mortem examinations; metastatic deposits in other organs, being regarded as the primary lesion; or else the presence of cancer remaining entirely undiscovered.

is here, moreover, specially useful by reason of its capacity for sustaining existence in the absence of nutriment. If *gastrostomy* be attempted, that operation, in two stages, should be performed early; in the later period, when emaciation has become extreme, it is better to decline operative interference, and rely solely upon opiate treatment combined with rectal alimentation by zymised suppositories, &c. *Intubation*, which involves irritation of the sore by a foreign body, is inadvisable; the introduction of a bougie has often proved quickly fatal.

Encountered soon after its inception, malignant disease of the pylorus permits radical cure by *pylorectomy*, the ring of small lymph-glands surrounding the part being simultaneously excised. Early exploratory incision in suspicious cases is thus indicated. The divided ends of the stomach and duodenum should each be sewn up, and the parts approximated by incisions in their long diameter, with subsequent employment of Senn's bone-plates. In advanced cases, *gastroenterostomy* may effect a transient prolongation of existence; hardly more, however, than may be gained, *without risk*, by opium with *cucaine*.

Enteroectomy may be attempted for early intestinal lesions. Obstructive symptoms will necessitate an artificial opening. Should the disease be of long standing, and the bowel be patent, no good purpose can be served by operative procedure. The continued administration of *opium*, with *glycerine* and *belladonna*, and frequent enemata, are the therapeutic measures of most service. As there is little or no pain, small doses only of opium or morphia are required; with passivity and avoidance of exertion, the patient may thus live long in fair comfort. The *opium-pipe* is here especially serviceable as a convenient vehicle for the drug, involving slighter tendency to constipation than with other methods of administration, and permitting the individual to graduate the dose to his or her particular needs. *Rest*, *careful nursing*, above all the employment of *pre-digested food*, are essential. *Cucaine hydrochlorate*, in one-grain doses, given as a pill three or four times daily, obviates vomiting, &c.

Should disease of the rectum be recent, and the parts movable, *proctectomy* is indicated. Access to disease high up this canal is

gained by a posterior median incision to the tip of the coccyx; the affected part can then be dragged down, ensnared by the wire loop of the galvanic *écraseur*, and thus removed. Those severe operations which involve resection of the coccyx and even of the sacral vertebrae, are inefficient and worse.

When there is adhesion to the bony structures, excision is inadmissible. It is always requisite to examine carefully beforehand the condition of the *liver*. By means of the superior hæmorrhoidal veins (branches of the inferior mesenteric), special facility is afforded for the propagation of metastases to that organ; such long produce no symptoms. In face of a hepatic tumour, tender on pressure, proctectomy is useless. The lumbar lymph-glands become implicated in the later stages of rectal disease, when the growth has continued more than a year; but seldom at an earlier period.

Epithelioma at the *anal margin*, at an early period, infects the superficial *lymph-glands* in the groin on the corresponding side. These also require removal concurrently with the malignant growth.

The fatty tissue of the ischio-rectal fossa favours incisions, wide of the disease-area, in anal epithelioma or in rectal disease near the orifice. In aged and debilitated persons removal should be effected by the galvanic *écraseur*.

Rectal operations are more easily performed in the female than in the male. Should the malignant infiltration approach the rectal-vaginal septum, it is best to remove this; life with a recto-vaginal fistula is preferable to "recurrence." Subsequent catheterisation for a few days is essential. Should it be possible to remove a part only of the lumen of the tube, cicatricial contraction afterwards will be partially precluded; but the chances of cure must not be sacrificed to this consideration. It is to be remembered that the infiltration tends to extend circumferentially around the gut, and that local diffusion is promoted by the very copious plexus of lymphatics in the sub-mucosa.

After the removal of malignant tissue from the upper portion of the rectum (by the galvanic *écraseur*) the bowels should be kept locked for forty-eight hours; subsequently, repeated small doses of *glycerine*, combined with some bactericidal agent such

as the American "Listerine," are indicated. In such cases, the practicability of operation can usually be decided only under anæsthesia; apparently inaccessible lesions can then be easily reached.*

After this procedure the cavity should be temporarily plugged with tampons saturated with the extract of *Pinus canadensis* diluted with glycerine (*part. aq.*), to be removed on the following day. Every precaution must subsequently be taken to ensure free drainage; the upper part of the trunk should be kept slightly elevated, and the wound frequently syringed with *boroglyceride* solution (7 per cent.). After the lapse of a fortnight, a bougie should be introduced and left in for several hours daily. In incurable cases of rectal cancer, the opium-pipe is useful. Whenever opium thus, or by any other means administered, causes constipation, the fæces accumulate in the rectum and are easily dislodged by enemata, which should be regularly resorted to at least twice a week. The condition is dangerous only when that precaution is neglected. Warm hip-baths often greatly alleviate local pain.

Cancer patients who suffer from obstruction, partial or complete, are always weak and emaciated to the last degree. When an operation for the relief of obstruction is indicated, it is important therefore to avoid prolonged anæsthesia; not to expose the peritoneum, often in a semi-inflammatory condition, if not actually implicated by the disease; and lastly, to relieve symptoms as speedily as possible. Hence the *old lumbar operations* are greatly to be preferred to those which involve a peritoneal opening and a lengthy operation; in my own hands, these have proved eminently satisfactory, without risk or after-drawback. By mapping out with the thumb-nail the anterior edge of the *quadratus*, there is rarely difficulty in reaching the bowel. By dragging down the intestine and suturing this to the integument as high as possible, union is secured at a sufficiently acute angle to obtain an efficient "spur." Operations which involve the needless removal of healthy bowel are particularly to be deprecated. If inguinal colotomy be resorted to, the method of Mr. Harrison Cripps,

* See note of two such cases in the *Brit. Med. Journ.*, Oct. 11, 1890. There has been no "recurrence" in either.

which preserves the patency of the canal, and is attended by no such mutilation, should be selected. The plan of dividing the intestine and sewing up the lower end is dangerous, inasmuch as the natural position of the parts may be reversed by adhesions, and the upper extremity may be mistaken for the lower.

Such formidable procedures as that of Kraske, which involves resection of the coccyx and of the lower sacral vertebrae, presuppose an advanced stage of disease, with secondary metastases and extreme depression of the physical powers. No advantage can ever be attained by attempting the excision of rectal cancer adherent to the bony structures, and the immediate risks are great. Madelung's method of performing inguinal colectomy, prior to an excision of the rectum, involves two severe manipulations in place of one, and will hardly commend itself to the taste of the average English patient. The assured failure of these, and of any similar operation which may be devised for cancer, must of necessity lessen that low confidence in the resources of orthodox surgery often exhibited by the public; and must materially strengthen the hands of the never-failing quack.

In the cases indicated, there will almost of necessity be secondary deposit in the liver, or elsewhere; and the metastases will progress, with greatly accelerated rapidity, should the patient survive immediate risks.

The stimulant and life-sustaining effects of eucaïne, in addition to its local anæsthetic influence, render this drug a most useful adjunct to opium, for almost all instances of cancer affecting the alimentary canal.

CHAPTER VIII.

THE SKIN.

Varieties.—The cells of the epidermis originate *epithelioma*, the most common variety.

The cognate cells forming the outer root-sheath of short hair-follicles, produce *rodent ulcer*.

In pigmented warts, moles, or nævoid stains, the Malpighian layer of the epidermis gives to *melanotic cancer* (epithelial). The connective tissue of the derma may be the starting-point of *sarcomata*, sometimes commencing as a polypoid growth (*molluscum fibrosum*).

Xeroderma pigmentosum (Kaposi's disease, and *granuloma fungoides* (Dühring's neoplasm) are obscure and rare maladies. A *colloid* degeneration of the skin has been described, but is non-malignant. The edges of cicatrices are prone to *epithelioma*; while the scar-tissue proper gives origin to *cheloid* tumours, quasi-malignant.

Causes.—Of the three first (*epithelioma*, *rodent ulcer*, *melanotic cancer*), *continuous mechanical irritation*. *Soot-particles* have a peculiarly irritating influence, partly mechanical, partly chemical, upon epidermic cells. Tar and crude petroleum have been credited with a like effect (p. 276).

Of *sarcomata*, *traumatism* in one form or another, commonly in that of sudden injury, a blow or over-strain.

Site.—The malignant process may attack the integument, wherever the causes specified are brought to bear. The liability of any particular portion is almost exactly proportionate to the degree of exposure to such local agencies.

Warty growths, pigmented or otherwise, lead to cancerous

lesions, through being more readily and continuously irritated. Hence, warts on the face are more commonly found to result in epithelioma, than these little outgrowths on more sheltered regions of the body; such on the genital organs ranking next in frequency as progenitors of cancer.

Treatment.—The proper rôle of chemical escharotics in cancer treatment, is, with a single notable exception, limited to deposits primary or secondary in the skin, where their employment often presents considerable advantages. It does away with the necessity for anaesthesia, which, from the popular point of view, is the note of the dreaded "operation"; precludes hæmorrhage from a vascular region; and often effects a more radical obliteration than can be secured by incision-methods. Caustics are adopted for small and superficial disease-areas only; resort to them is prohibited by the infiltration of the deeper tissues, by proximity of important structures such as the eye, a serous membrane, or large blood-vessel; and is out of the question whenever there exists reason to suspect lymph-gland infection. The most useful for skin-lesions is the stick *potassa fusa* (p. 204). The numerous "pastes" are, without exception, uncertain, tedious, and painful.

Small chronic *epitheliomata*, warty growths or ulcers, when on the face, are best dealt with by the *potassa fusa*. The stick, in a suitable holder, should be moistened, then pressed on the part and slightly rotated, until all is destroyed, when action is arrested by a sponge or pad dipped in water. Generally two or three minutes' application is sufficient; care must be taken that no liquid trickles over the adjacent skin; hence the stick should be very slightly wetted, a pad of wet cotton-wool held at the margin, in readiness to absorb any surplus exudation; and the eschar mopped carefully, should there be indication of superfluous fluid. Attempts to guard the adjoining skin by strapping are useless. Sensibility may be blunted by a previous injection of *eucaine hydrochlorate*. Afterwards a poultice, to favour separation of the slough, is needed. On the face, subsequent union is more rapid after this procedure than in most other parts of the body.

Epitheliomata or *rodent ulcers* about the eyelids do not permit resort to chemical escharotics. They are best dealt with

by the blade of Paquelin's thermo-cautery, used as a cutting instrument, due precaution to guard the eyeball being taken. *Difficulty in eradicating the latter very localised form of cancer, lies mainly in its proximity to the periosteum.*

Superficial epithelial lesions on the integument of the trunk, demand excision by the knife. On the limbs, a similar procedure—removal of the nearest lymph-glands in the infection-path, whenever the disease is recent. When the deeper parts are involved, amputation may be needed, with removal of the superficial inguinal or axillary lymph-glands on the corresponding side.

Melanotic cancer requires prompt excision by knife, or destruction by caustic, of the primary tumour, together with removal of the dangerous lymph-glands. The only hope of cure in this extremely virulent form of cancer, lies in the removal of the latter before they have undergone appreciable enlargement; subsequently to any marked increase in bulk, the chances of future immunity become extremely scanty.

Rare *sarcomatous* growths of the integument will be eradicated by excision of the tumour, with a wide margin of the surrounding tissues. Should the proximal lymph-glands be enlarged, an advanced stage of disease with blood infection and visceral deposit is indicated, when removal will be palliative only.

Resort to the *ligature* for the purpose of destroying warts or papillomata, often succeeds in irritating the cell-elements into cancer. A similar result is frequently seen after the employment of feeble caustics, such as nitrate of silver, or liquid carbolic acid.

Any *pigmented* warty growth is especially dangerous, as a Melanotic Cancer in embryo; and is often seen to undergo the malignant reversion-process on the most trivial provocation. See cases in my paper differentiating the skin variety (*epithelioid*) from the ocular *sarcoma* (*Lancet*, Oct. 15, 1892).

CHAPTER IX.

THE BONES.

Species.—*Sarcomata* of the spindle- and mixed-celled varieties, prevail.* They appear to be, for the most part, primarily derived from the osteo-genetic layer of the periosteum. Owing to their eventual implication of the marrow, and to the facilities which that structure affords for wide dissemination, many cases are of highly *acute* type.

In connection with sarcoma, there may be *cyst-formation* on an extensive scale, with scanty fusiform cells, and little solid material. The walls of the cyst or congeries of cysts are highly vascular, their cavity filled sometimes with serum, often with nearly pure blood, or with blood-clot more or less recent. These "blood-cysts" are highly cancerous, and prone to "recur" after removal, their malignancy depending upon their spindle-cell elements. The most acute are of congenital (naevoid) origin; but small cysts may also arise from simple extravasation, in connection with an ordinary sarcoma, or may result from the mucoid degeneration of its cell-constituents.

With the spindle-celled basis of bone sarcomata, are occasionally mingled *giant-cells*, the so-called "myeloids." Another constituent, particularly abundant in tumour-formation from

* If all the constituents of the bones be regarded as of the connective-tissue class, no malignant growth other than a sarcoma can primarily appear therein. But there is doubt whether the marrow should not rather be referred to the class of "lymphoid" (adenoid) tissues; in which case a primary central tumour of bone will rank with the lympho-carcinomata (*q.v.*). Unfortunately, the pathology of the marrow has as yet received scant attention from investigators; and morbid affections of this very important structure are almost entirely shrouded in the mystery which largely invests its physiological attributes.

not fully ossified epiphyses, is *cartilage*, which may subsequently be converted wholly or partially into bone. Portions also of the parenchyma may exhibit the *mucoid* degeneration. In this way arise various mixed and obscure tumour-formations, variously designated *chondro-sarcoma*, *chondro-myo-sarcoma*, *ossifying* or *calcifying enchondroma*, *osteo-sarcoma*, &c. Among these we find every gradation in degree of malignancy and in details of microscopic structure, from the mass composed of normal and well-organised cartilage or bone (*chondroma osteoma*), to the most acute sarcoma. (See p. 132 *et seq.*)

"*Osteoid*" sarcoma is a rare and acute variety of the spindle-celled species, in which the whole embryonic parenchyma undergoes conversion into ill-formed bone, a similar tendency being apparent in the metastatic deposits. Some approximation to the condition in the shape of a fragile bony skeleton, of detached spicules of bone, or even of an amorphous deposit of lime salts, prevails in most bone tumours of any duration.

The rare species known as "*chloroma*" is found only in children, and on the facial or cranial bones. It appears to be a periosteal spindle-sarcoma, modified by some peculiar degenerative process, not yet understood.

Lympho-carcinoma, arising in lymph-glands, or other lymphoid tissue in proximity to bone, may present itself as a tumour infiltrating and inseparable from the latter structure. Many such growths are recorded as "primary tumours of bone"; they consist of small round or ovoid cells, without admixture of that embryonic spindle-celled tissue, which distinguishes the true sarcomata.

The Marrow is a common vehicle of secondary cancer dissemination. Many new-growths, recorded as primary "tumours of bone," appear to have been really metastases from some visceral or other malignant lesion, not discovered at the autopsy. Others implicating the marrow have seemingly sprung from the periosteum. Authenticated instances of "central" sarcoma are rare, and little is accurately known of their etiology or pathology. The manner in which the structure is shielded from traumatism by its bony case accounts for its relative immunity.

Huxley (*Elementary Physiology*) has remarked how strongly the vital activity and incessant cell-changes carried on throughout life in the marrow, contrast with the physiological passivity and permanence of the bony case, which screens these from observation. See also note, *ante*, p. 72, on the peculiar LATENCY of carcinoma-deposits in this tissue, secondary to mammary cancer; and on the probable association of some obscure bone-lesions with a malignant deposit elsewhere. For such cases bearing on the pathology of *mollities ossium*, and of *osteitis deformans*, see the following in the *Path. Trans.*

"*Myeloid sarcomata* of lower jaw and rib, with *mollities ossium*" (Butlin, xxxi.). "Hyperostosis of lower jaw, right parietal bone, left clavicle, and both tibiæ, with *cancer* of the right lung" (Cayley, xxix.). "Two cases of hyperostosis and tumour of bones" (Goodhart, *ibid.*). "Osteo-porosis of calvarium, clavicle, femur, and rib, with an *endothelioma* on the *dura mater*" (Wilks, xx.). "Mollities ossium" (Hermann Weber, xx.). "Hyperostosis of tibia and curvature of its shaft, with *spindle-celled sarcoma* in upper epiphysis" (Howse, xxix.). "Mollities ossium" (Adams and Dowse, xxiii.). I have not quoted various others, in which bone-lesions were ostensibly conjoined with *mammary cancer*, believing these to be sufficiently explained by my own researches. In all the preceding, the existence of malignant disease in some form or other was either assured or highly probable. See also Mr. Eve's case at p. 357.

Hirschberg (*Cent. für Chir.* 46) records a case of osteo-malacia in a person aged thirty-eight; the duration was four years. Several of the long bones had undergone fracture; these were softened, decalcified, and in parts absorbed; new osteoid tissue had been formed at the latter. Numerous *cysts* of varying sizes referred to the liquefaction of blood-clots, were found throughout their substance. In one tibia, a tumour presenting the microscopic features of a *myeloid sarcoma*, was found after death.

Causation.—*Sudden mechanical violence* is the usual forerunner of a sarcoma in the bones of the limbs or trunk.

The effect of *continued irritation*, and of *chronic congestive conditions*, is apparent in sarcomatous growths from the alveolar process of the jaws (see *Epulis*, p. 120).

Occasional transition from a benign tumour-formation to malignancy is exemplified in the mixed species (see p. 124).

The rare influence of a *congenital* element is illustrated by malignant "blood-cysts"; sometimes consecutive to an *angioma*.

The proclivity of the *periosteum* to generate malignant disease, is accounted for partly by the abundance of cell-elements in its osteo-genetic layer, and the cell-growth which

is there actively taking place; in the main, however, by the liability of this structure to sustain contusions.

Mr. Butlin (*Sarcoma and Carcinoma*, p. 110) points out that in the portions of long bones where malignant growths are most rife: "All these parts contain cancellous tissue in greater or less abundance; their position renders them liable to squeezes, blows, and injuries of various kinds; in the process of development of the bones, they are the parts which are the first to ossify, the last to be united with the shaft; and the direction of the nutrient artery is from them, not towards them." He adduces 16 cases of sarcoma in the humerus; 10 appeared in the upper third, not one in the lower. Of 49 on the femur, 34 sprang from the lower half. Of 30 on the tibia, 22 attacked the upper third. In the fibula, five are recorded, all in the upper third.

The degree of exposure to TRIVIAL injuries, seems the most valid element in the liability of a bone to sarcoma. It may be noted that after one really severe, as a fracture, we seldom hear of a malignant sequel; it is after slight blows which do not involve confinement to bed that these growths are most prone to appear in the bones of the extremities and trunk.

Liability of particular Bones.

The bones most often attacked by true sarcoma are the femur, tibia, humerus, and lower jaw. Mr. Butlin allots 40 cases of spindle-celled sarcoma as follows:—femur 14, tibia 7, humerus 5, lower jaw 5, skull 3, fibula 2, ulna, clavicle rib, tarsus and metatarsus, each 1.

If the total 160 cases of Mr. Butlin's elaborate work be analysed, the ratio slightly differs. These include tumours classed as "round-celled," "spindle," "giant," and "mixed-celled"; a division which affords scope for the introduction of morbid growths probably not derived from the connective-tissues. The term "round-celled sarcoma" is apparently used by this author (p. 188), or by those whose cases he cites, to denote lympho-carcinoma as well as the preceding.

The eighty sub-periosteal tumours are apportioned as follows: femur 28, tibia 13, skull 10, humerus 8, pelvis 7, lower jaw 3, fibula 3; ulna, clavicle, scapula, 2 respectively; radius, rib, each 1. The "central" arose from: femur 21, tibia 17, lower jaw 11, humerus 8 ulna 4, skull 4, radius 3, fibula, sternum, tarsus and metatarsus, each 2; pelvis, metacarpus, rib, clavicle, scapula, vertebra, each 1.

Sex.—By reason of their more laborious occupations, and greater exposure to mechanical injury, men are much more

liable to sarcomata of bone than women. Twenty-four of the spindle-sarcomata tabulated by Mr. Butlin occurred in males, 16 in females. Similarly, of 20 osteoid sarcomata recorded by Sir James Paget, 15 appeared in men, only 5 in women. Mr. Butlin (*op. cit.*) refers 102 cases of other malignant new-growths in bone to the male sex, against 57 in the female.

Age.—From malignant growths in bone old age is relatively free; youth and early middle age are the periods specially selected. The fact may be explained partly by greater exposure to mechanical violence at these epochs; partly by the presence of a greater number of unorganised cell-elements in the more active periosteum of the young.

Of 79 sub-periosteal tumours in Mr. Butlin's copious lists, 11 occurred before the age of 10, 21 at ætat. 10-20, 30 at 20-30, 8 at 30-40, 4 at 40-50, 4 at 50-60, 1 at 60-70.

Of 78 "central" sarcomata, 2 occurred in children under 10, 10 at ætat. 10-20, 20 at 20-30, 18 at 30-40, 12 at 40-50, 10 at 50-60, 5 at 60 to 70, 1 at 70 to 80.

Of 19 osteoid sarcomata, 5 occurred at ætat. 10-20, 9 at 20-30, 4 at 30-40, 1 at 50-60 (Paget).

No sub-periosteal growths are by this writer credited with giant-cells (MYELOIDS); but 18 out of 80 "central" sarcomata possessed these bodies. They are allotted as follows: Lower jaw 5, femur 5 (4 from lower epiphysis, 1 from middle third), tibia 3 (upper epiphysis), fibula 1 (upper epiphysis), ulna 1 (lower third), radius 2 (lower epiphysis). (See p. 138.)

Osteoid sarcoma generally attacks the lower end of the femur: $\frac{1}{4}$ cases originated here (Paget); the skull, tibia, humerus, ilium, fibula were each attacked in two instances; the ulna and metacarpus in one. Both these forms last mentioned are variants of the spindle-sarcoma, the typical sarcoma-species.

Symptoms and Diagnosis.—In the later period of its growth, when the diagnosis unfortunately has become practically useless, malignant tumours of bone are readily recognisable. A huge rapidly growing mass presents regions very unequal in consistence, some of extreme hardness, some "boggy" and

fluctuating. There is a covering of adherent tense skin, marbled by dilated blood-vessels; eventually this becomes livid, and removed by ulceration. The phenomenon known as "egg-shell crackling" may be produced in two ways on slight pressure. It may be due either to a very thin capsule of bone intact over an enclosed tumour, or, more commonly, to delicate spicules of newly formed bone radiating through the parenchyma from the underlying periosteum. When ulceration has taken place, the excessive vascularity of the new-growth makes itself still more conspicuous by repeated attacks of hæmorrhage; and there is an exuberant fungous protuberance, large portions of which from time to time sphacelate.

The adjoining *lymph-glands* are not implicated by the lymphatic channels, as in carcinoma, and long remain healthy. They eventually enlarge, however, either through direct invasion by the sarcoma-cells, or in consequence of general blood-infection. Hence this physical sign coincides in point of time with the appearance of multiple deposits in the viscera, or in other bones. There is extreme anæmia and prostration; when the periosteum is intact, severe gnawing pains. Large exuberant cell-masses, which do not involve tension, may, however, cause little suffering.

The secondary metastases commonly show a preference for bones elsewhere. Very numerous tumours, developed first in the marrow, grow from distant parts of the skeleton. At its inception, however, the cancer-process in bone may long escape recognition for many reasons; most of all, on account of the youthfulness of the average patient. The history of a blow or a fall, followed by the appearance of a progressive and painful tumour, should indicate an immediate *exploratory incision*. Thus it may become possible to eradicate the disease before metastatic infection has taken place. Dissemination by way of the marrow probably begins as soon as that structure is reached by the advancing growth (see cases at pp. 131, 133, 135).

An exploratory incision is also the most appropriate treatment for maladies apt to simulate cancer, such as *necrosis*. When the *lower jaw* is thus affected, a tumour may result, which can only be distinguished from sarcoma by this measure. The patient is commonly old. It is hard, large, extremely painful,

covered by livid skin, riddled with sinuses: its bulk being apparently enhanced by an adherent mass of enlarged lymph-glands. Pieces of dead bone are from time to time exfoliated; the fact does not assist recognition, as the same occurrence takes place in cancerous growths. Life is eventually terminated as surely as by sarcoma, if more slowly.

In the *femur*, tumours due to simple necrosis are found usually on the shaft; whereas sarcoma is more prone to attack the epiphyses, particularly the lower. The former are only slowly progressive, and affect the natural shape of the bone, being oblong or ovoid; suppuration with inflammatory phenomena may be wholly wanting. In both the cancerous and non-cancerous disease there will probably be a history of injury; in the former, the patient is often, in the latter almost always, youthful.

Pulsation, indicative of arterial hyperæmia, is more often associated with a malignant growth than with any other bone-lesion. It occurs, however, in only a very small proportion of cancer cases.

Treatment.—The special “diffusion-paths” are the central medulla of the long bones; the cancellous tissue with its included marrow, of the short; the periosteum of both.

Amputation through the shaft of a *long bone*, above the tumour, can prove curative *only when the disease has not implicated the marrow*. If, however, such a step be resorted to, the higher the division takes place the better; on account of the tendency to periosteal infiltration.

Deposit, palpable or microscopic, in the marrow of long bones, involves rapid diffusion along the medullary canal; with speedy infection of the blood, and general diffusion of metastases. It is an early event in the majority of malignant bone-lesions; hence amputation through the shaft of the long bones is so often unfortunately followed by prompt “recurrence.” There may long be no outward sign of the marrow-infection (see p. 131). In case of osteoid sarcoma (p. 133) several masses of malignant bone were found scattered throughout the central medulla of the femur, with no corresponding enlargement of the shaft. Hence, whenever a bone becomes the seat of primary cancerous disease of any kind, immediate

removal of the entire structure, supposing that to be surgically possible, is the only fitting treatment. The gravity of these deplorable cases demands radical measures when interference is attempted at all. The youth and vigour of many patients countenances the less hesitancy in resorting to amputation *at the proximal articulation*.

Enlargement of lymph-glands not directly invaded by the growing mass, denotes propagation by the blood-current, and is synchronous with deposits in the viscera. When this condition has taken place in sarcomata of the long bones, or when the marrow has received infection, amputation through the continuity of the bone may procure brief prolongation of life, with death from comparatively painless internal metastases; but removal at the joint above would be uselessly severe.

In sarcomata of bones which have no central medullary canal, there is not usually that rapid blood-dissemination which we see in the long. On the other hand, these more quickly implicate the adjacent sub-cutaneous or sub-mucous connective-tissue. When an operation takes place, the removal of a wide area of adjacent seemingly healthy parts is thus indicated. The sarcoma-development here is often *chronic*; on the long bones, it is rarely other than *acute*. The slowly growing, partially organised or transitional forms of tumour offer a much more hopeful outlook, for surgical methods, than the rapidly infiltrating, parenchymatous, and *ab initio* malignant.

The most careful selection of cases for operative treatment is here no less necessary than in every other cancer-department. To amputate a limb, when there is a certainty of wide diffusion by the marrow, and hence of speedy "recurrence," perhaps more conspicuously than any other operative measure tends to involve ALL cancer-surgery in indiscriminating popular disfavour.

CHAPTER X.

THE BLADDER, PROSTATE, KIDNEYS, VESICULÆ SEMINALES.

I. *The Bladder.*

SPECIES.—A very varied assortment of tumours occurs within the bladder. Of non-malignant, *cysts*, *fibromata*, *leio-myomata*, *enchondromata*, *angiomata*, have been described; of cancerous, *epithelioma*, *sarcoma*, *colloid cancer*, *carcinoma* (?), *lympho-sarcoma* (?); of quasi-cancerous, *papilloma*, *myxoma*, *rhabdomyoma*. The more anomalous and exceptional will rank with *blastoma* (*q.v.*), as being derived from congenital abnormalities.

The line of demarcation between malignant and non-malignant tumours in this region is an extremely shifty and variable one; the local irritation set up by a benign tumour is apt to beget cancer, and such sequence is almost a matter of certainty in an aged person. Further, it may be pointed out that tumour-formations within the bladder are prone to *myxomatous* and other degenerative changes, which often combine to render their pathological characters obscure; that the rugose mucous membrane with its incessant alternations of tension and relaxation, and the fasciculate arrangement of the muscular fibres, combine to impress upon tumours in general, whether cancerous or benign, a pedunculated or papillomatous condition. Finally, that the malignant nature of some of these is to some extent disguised by the severity of the local symptoms they produce, as well as by the law common to cancerous tumours growing freely on a mucous surface—of relatively slow tendency to infect the lymph-glands or distant viscera.

Thus, "villous papillomata" of the bladder, formerly and correctly recognised as "villous cancers," are morbid products of the vesical epithelium, ranking pathologically with *epithelioma*. They are soft, vascular, pulpy masses, composed of very numerous and very delicate arborescent fringes. Each of the latter consists of a slender connective-tissue stalk, coated by several layers of cylindrical epithelium. (See Plate, XII., fig. 1.) The local symptoms predominate in importance, and death may be caused by exhausting and incessant hæmorrhage before secondary deposits in the lymph-glands or viscera have been established. *Ab initio*, there is some cell-infiltration at the base, and "recurrence" here takes place if only the prominent villi only be removed by the surgeon. Later in the case, much of the pulpy mass may be destroyed by sphacelus, a characteristic epitheliomatous ulcer remaining. *Auto-inoculation* on various surface-spots is a common occurrence.*

The restriction of these villous growths to old age, their extreme vascularity, their microscopic and causation-phenomena, their progressive character, proneness to reappear after removal and fatality, prove their truly cancerous nature, even when death has taken place before the production of metastases. A considerable number of neoplasms of other species here approximate to the papillomatous type, are either associated with villous fringes on the surface, or have peduncles at some period of their career. Hurry Fenwick (*Path. Trans.*, xxxix. p. 166), speaking of *villous papillomata*, states that 43 per cent. of 60 cases examined were slightly pedicled; 20 per cent. were broadly pedicled or sub-sessile, 33 per cent. were sessile. Of 50 *sarcoma* cases (p. 171), 20 per cent. had a villous covering; in children these growths are usually polypoid and multiple; in adults, single and sessile, only 10 per cent. possessing pedicles. Superficial villi may be eventually removed by ulceration: the pedunculation of a small polypoid growth disappears when a large bulk is

* Plate M" p. 73. in Mr. E. Hurry Fenwick's admirable Jacksonian Prize Essay on *Tumours of the Urinary Bladder*, well shows the *auto-inoculation* phenomena of villous papillomata. Plates N" and N" demonstrate the epithelial cell-infiltration, primarily grouped in acini, which prevails at their base.

attained. Hence, statistics of this particular feature must be accepted with reservation.

The epithelial lining of the bladder is the source of most intra-vesical malignant lesions; which, whether prominent or sessile, whether soft villous fringes, stalked polypoid tumours, or infiltrating cavernous ulcers, are really *epitheliomata*. True *carcinoma* may arise in the racemose glands at the neck of the bladder, but is rare. *Lympho-carcinoma* (lympho-sarcoma) can affect the organ only by invasion from the iliac or sacral lymph-glands. Recorded cases of "scirrhus" and "encephaloid" cancer are generally referable to the prevailing species, epithelioma. Degeneration-processes are rife in tumour-formations of any duration, and greatly obscure the tissue-origin.

Sarcomata rank next to the epithelial outgrowths in order of frequency. *Myo-sarcomata* are derived from the muscular fibres (p. 148). The latter species has been confounded in most cases with the former; occasionally the areas of small nuclear cells which constitute large tracts of the myo-sarcoma may have caused the disease to be recorded as "lympho-sarcoma."

The mucoid degeneration very commonly affects tumour-formations of every class. Hence, "colloid" cancer has been not seldom reported, and considerable areas of the connective-tissue new-growths may present the characters of the "mixed" *myxoma*. According to Mr. H. Fenwick, "sarcoma" in children is often described as myxoma.

Albarran (*Tumeurs de la Vessie*, p. 135) refers, on the authority of Lixio, to a solitary case of *rhabetomyoma* in a child of thirteen. Cartilage is a rare element; the parenchyma of vesical "sarcomata" is most often round-celled, but varies in appearance at different parts of the tumour (H. Fenwick). A mixture of heterogeneous tissues is alluded to in Appendix A. as a distinguishing mark of the *blastomata*, in which class the malignant vesical lesions of young children should be included.

Of fifty cases by Mr. Hurry Fenwick of "Sarcoma of the Bladder" in the *Path. Trans.*, xxxix. 171; seventeen displayed spindle-celled structure; the majority (34.5 per cent.) were of the mixed composition, with predominating round-cells, referred to above; in only one,

cartilage occurred. The most common age was before five and after fifty; males predominated in both categories. Twenty per cent. of the tumours had a villous covering. *In children, they were multiple and polypoid; in adults, they were single, and generally sessile; only 10 per cent. of the latter had pedicles.* The points italicised prove the necessity for differentiation between the two classes; as here set forth.

Of six cases by Mr. Southam, in the same volume, and similarly entitled, one patient was a child of nine, the ages of the remainder ranging from forty to sixty-nine; five were male; five tumours were sessile; in three the surface was villous as indicating complex and puzzling details of structure. Four cases of nine analysed by Mr. D'Arcy Power (*ibid.*) are respectively stated to be isolated instances of "fibro-sarcoma," "lympho-sarcoma," "myo-sarcoma," and "alveolar sarcoma." Gross (*System of Surgery*) says that "sarcoma is one of the rarest of the neoplasms of the bladder."

At p. 179 of the same, the frequent association of villous papillomata with cancer in an examination of 150 museum specimens is noted. An instance of epithelioma associated with the ova of *Bilharzia* is recorded (Fenwick).

The bladder is prone to undergo secondary infiltration by malignant lesions of adjoining parts, notably by those attacking the uterus and vagina. It is also an occasional recipient of metastases from the kidney, or even from distant organs without the genito-urinary tract. In the former event, secondary tumours are the result of auto-inoculation, detached cells or nuclei from the renal growth passing down the ureters and becoming lodged in the bladder. Cases recorded as "cancer in the bladder, with metastases in the kidney," should be more probably read in the reverse sense. Of 88 cases of tumour, benign as well as cancerous, in his own practice, Albarran (*op. cit.*) describes 68 as epitheliomata, 13 as benign polypi, 3 sarcomata, myxomata, and myxo-sarcomata, 2 fibromata and fibro-myomata, 1 myoma, 1 angioma. Of 44 from other sources microscopically examined by him, 32 were epitheliomata, 9 papillomata, 2 sarcomata, 1 myoma. Of 265 reported by various other authors, 198 were of epithelial origin, 38 sprang from the connective-tissue, 16 were muscular.

Site.—The region of the *trigone* is that most exposed to cancerous development; yet this seems to begin usually at its margins or at the orifice of the ureters, rarely on the trigonal surface. Hurry Fenwick (*Path. Trans.*, xxxix.), from an exam-

ination of 60 specimens of *villous papilloma*, assigns 86 per cent. of "single papillomata" to the inferior zone; 43 per cent. of those inspected arose from the orifice of the right ureter, 26 per cent. from that of the left, 10 from the inter-ureteral bar. The elaborate table given by Albarran of *epitheliomata* (*Tumeurs de la Vessie*, p. 48) refers 38 cases mainly to the base of the bladder, 24 principally to the posterior wall, 4 to the lateral wall, 3 to the anterior and superior walls, 3 to the neck, 8 to the orifice of the right ureter, 5 to that of the left.

Of 49 *sarcomata*, the same writer ascribes 14 to the trigone and adjoining parts, 25 to the posterior or lateral walls, 8 to the anterior wall, 2 to other regions.

In 50 cases investigated by Mr. Hurry Fenwick (*Path. Trans.* xxxix.) the inferior zone is stated to be the most frequent site in children, the posterior wall and base in adults.

Causes.—The cause of malignant disease of the vesical mucous membrane is necessarily somewhat obscure, but from the analogy of epithelial cancer in other sites must be referred to *local irritation* associated with *chronic congestive conditions*.

Any source of unhealthy urine, and thus of local congestion, may result in malignant disease, usually epithelial. Hence, the predominance in the statistics of elderly males who have greater alcoholic proclivities than women, and who are also exposed to prostatic troubles. An enlarged prostate has not seldom resulted in cancer, and so also has calculus in the bladder. The special liability of the trigonal region is referable to the irritation of decomposing residual urine.*

The patients who suffer from vesical epithelioma have often passed through an immediately antecedent period of *trouble and worry*. It is here uncertain how far the influence of

* For example of direct mechanical irritation, see Dr. Beaven Rake's case in the *Path. Trans.*, xxxvii. A patch of villous papilloma was found at a spot impinged upon by a straw, $4\frac{1}{2}$ inches long. Also Dr. David Newman's case (*Path. Trans.*, xxxix. p. 166) of papilloma at the apex of the bladder, from contact with a large oval stone. Mr. Hurry Fenwick speaks of having met with the association of calculus and cancer in one-eighth cases (*Brit. Med. Journ.*, May 6, 1892).

neurotic factors in generating cancer is *indirect*, as by modifications in the urinary secretion, or by resort to alcohol.*

The exciting causes of malignant vesical growth, other than the epithelial, are still more obscure. In the aged they, like the latter, follow chronic congestive conditions. Moreover, the rugosity of the mucous membrane, the fasciculate arrangement of the muscular fibres, and the frequent alterations in tension, combine to favour the partial detachment of minute tissue-shreds. These subsequently become hypertrophied, constituting fibrous polypi; at a still later period the continuous irritation of the projecting or pendulous body results in a malignant development. A similar process is occasionally known to take place in other mucous tracts; as, for example, in the rectum and the nasal cavity; but in these latter the irritation set up by the polypus is not usually so severe as in the case of the bladder, and malignant sequelæ are less commonly witnessed.

The relative number of malignant growths styled "sarcomata" in the bladder of young children, constitutes an exception to the general laws of cancer-growth, which demands explanation. In all probability these cases, together with those of mixed tumour-formations in individuals of more advanced age, are referable to persistent foetal structures. Cartilage is an occasional constituent of both; a fact indicating vestigial origin (refer to p. 348 *et seq.*).

Sex.—To cancer of the bladder, males are most liable.

Of 265 cases of bladder-tumours (benign and cancerous) collected by Albarran (p. 161), 179 occurred in men, 86 in women. Of the *epithelial*, 177 were in the former, 21 in the latter. Of connective-tissue neoplasms, 24 appeared in males, 14 in females. Of growths from the *muscle-fibre*, 10 were in men, 6 in women.

Of 25 cases of epithelioma collected by Mr. Hurry Fenwick (*Jacksonian Essay*, 1888), 23 occurred in males, 2 in females. Of 95 cases classed as "carcinoma" (p. 126), only 15 were in females.

The male sex exhibits a similar pre-eminence in extreme

* An intelligent old nurse, lately under my care, with "recurrent papilloma," dated all her symptoms from a nervous shock: a rat bit her nose during sleep!

youth; also in proclivity to benign growths. Of 8 vesical sarcomata in children, the patients were male in 6 instances. Of 9 leio-myomata cited by Fenwick (p. 113), 9 were in males, 3 in females.

Auto-inoculation.—Multiplicity of endo-vesical tumours, a phenomenon which in most instances must be referred to a local grafting-process, is common in those of the epithelial class, and is occasionally seen even in the sarcomata. According to Mr. H. Fenwick, villous papillomata are multiple in 40 per cent. of the cases. For a typical instance in connection with a connective-tissue growth, see *Path. Trans.*, xxxvii. The same surgeon removed from the bladder of a boy, aged eight, a half-pint measureful of polypi described as "fibro-sarcomata." There was quick "recurrence," and after death the whole cavity was found profusely studded with pedunculated tumours, varying in size from that of a cherry to a plum.

Age.—In the bladder, malignant disease, whatever its form, appears as the special appanage of advanced age; albeit with a minority of exceptions to the general rule.

Thus, of the 198 *epithelial* new-growths (probably always cancerous) recorded by Albarran (p. 163), none occurred under the age of twenty years. At *ætat.* 20-30, 8 cases; *ætat.* 30-40, 22; *ætat.* 40-50, 35; *ætat.* 50-60, 67; *ætat.* 60-70, 54; *ætat.* 70-80, 12.

Of the 38 *connective-tissue tumours* (often, but not always, malignant), 5 were in children under 10 years (4 males, 1 female); at *ætat.* 20-30, 8; *ætat.* 30-40, 3; *ætat.* 40-50, 6; *ætat.* 50-60, 13; *ætat.* 60-70, 3; *ætat.* 70-80, 3.

Of the 16 "*tumeurs musculaires*" (rarely cancerous), 1 occurred below the age of 10; at *ætat.* 11-20, 3; *ætat.* 31-40, 1; *ætat.* 41-50, 5; *ætat.* 51-60, 4; *ætat.* 60-70, 1; *ætat.* 71-80, 1.

Mr. Hurry Fenwick's Jacksonian Essay presents a like experience. Of 25 cases of *epithelioma*, 21 occurred after the age of 40. Of 35 styled "*carcinoma*," 32 after the same period of life. Of 39 *sarcoma* cases, 31 were in adults, 8 in children; 25 of the former occurred after 40. Of the 8 examples in children, 5 occurred at or under the age of 2 years; all were polypoid. Of 42 cases of "*villous papilloma*" (? *epithelioma*),

only 1 occurred under the age of 19, 24 after the age of 46 (p. 90).

Diagnostic Symptoms.—Of a malignant growth in the early *papillomatous* stage, recurrent attacks of profuse hæmorrhage, without the slightest pain or uneasy sensation, are often the initial symptom. Such a condition, occurring without obvious cause, in an *aged* person, is suggestive of malignancy; but is more suspicious in a woman than in a male, not being explicable by prostatic conditions.

After a variable period of this insidious commencement, micturition becomes more frequent, and the hæmaturia continuous; uneasy sensations in the region of the bladder gradually pass into a continuous aching in the hypogastric region, loins, and thighs. There is rapidly progressive emaciation and general failure in health. With the blood, there is profuse muco-purulent discharge. These phenomena are associated with the *second stage* of infiltration in the mucous and sub-mucous tissue.

A history of previous *mental distress and worry* will go far in pointing to the nature of the case.

Should the patient be a *woman*, prompt dilatation of the urethra under anæsthesia, followed by digital exploration, is indicated.

In the case of a *man*, in whom painless hæmaturia may be the result of simple prostatic enlargement, a preliminary course of oil of turpentine (15 minims), with 25 grains of chloride of ammonium, given three times daily, may be tried for a fortnight. Should the urine not then have become clear, careful examination *per rectum*, conjoined with abdominal palpation, and the introduction of the sound, may afford a reliable diagnosis.

The physical signs of malignant disease are often closely allied to those of *calculus*, and the two diseases may be associated. Should no stone be detected by the sound, an exploratory *supra-pubic incision* will be indicated. That measure has not infrequently effected a cure of obscure vesical symptoms, when no tangible lesion could be discovered; it affords in the male facilities for digital exploration and illumination, which cannot be gained by any perinæal method; it gives better

access, should operative removal be possible; finally, should ineradicable cancerous lesions be found, more relief to the male patient is yielded by supra-pubic than by perineal drainage.

Cystoscopic investigation, in expert hands, will convey a better idea of the actual state of the parts than may be gained by any other method. (For details, see Mr. Hurry Fenwick's well-known work.) It is useful, for instance, in ascertaining whether a new-growth is sessile or pedunculated, and in clearing up the diagnosis of an obscure case.

The vesical sound is of little use towards the recognition of a tumour; and may well prove actively injurious.

In rare cases, malignant disease of the bladder has produced a *tumour* in the hypogastrium. When there is infiltration of the sub-mucous coat, *tenderness on deep pressure* in this region points strongly to cancer. The discharge of shreds of malignant tissue by the urine "clenches the diagnosis."

It may be laid down as a rule, to which exceptions are rare, that any tumour-formation in the bladder of an aged person is either primarily cancerous, or will speedily become so.

Treatment.—The *female* bladder for purposes of operative interference with malignant growths is best approached by urethral dilatation, with preliminary digital examination. Should it be found advisable to attempt removal the outer two-thirds of the urethra should be incised, the inner third only being dilated. A pedunculated tumour can then be seized with forceps, caught in the noose of the galvanic *écraseur* and burnt off at its base. The divided urethra should finally be accurately sutured, and a self-retaining catheter left in the bladder for four to five days.

By the preliminary incision much more room is gained than would be possible with dilatation alone; and subsequent incontinence of urine, a necessary consequence of hyper-dilatation, is obviated.

Should it not be found possible to ensnare the morbid growth, the latter must be torn away with Thompson's forceps, or cut off with scissors, the base being finally well cauterised by the button-end of Paquelin's instrument. If scissors be resorted to, there will be copious hæmorrhage, and before the

application of the cautery it will be necessary to subdue this with sponges, wrung out in water as hot as can be borne by the hand, and firmly pressed upon the part. Failing these, a small stick-sponge, soaked in *tinct. matico*, should be applied in the same manner. The walls of the urethral wound should be carefully protected by bone spatulæ. Subsequently, the bladder cavity should be thoroughly cleansed by free irrigation with warm boracic solution ($\frac{1}{2}$ ounce to Oj). When the removal of the growth has not been effected with the galvanic *écraseur* or thermo-cautery, it has occasionally been found necessary to leave the bleeding surface clamped by long curved Wells' forceps for twenty-four hours.

The *male* bladder is best reached by the supra-pubic operation (*taille hypogastrique*); sufficient access not being attainable by way of the perinæum, Petersen's bag should be first passed into the rectum, high into the concavity of the sacrum. The bladder should then be distended by a previously measured quantity of warm boracic solution ($\frac{1}{2}$ ounce to the pint). For an adult, 8 to 15 ounces is the prescribed amount; for a child under five, about 3 ounces. The irrigator should be used for the purpose of injecting; the catheter being left in the bladder, and the penis firmly encircled by an india-rubber ring. If sufficient distension can be thus procured, it will be best not to employ the rectal bag, which, by pressure on the veins, promotes troublesome hæmorrhage during the operation. The bag is rarely needed by children, or by emaciated adults. When, however, the bladder cannot be made to rise far above the pubes by intra-vesical injection, a slightly less quantity of warm water, also previously measured, must be gently thrown up by the irrigator into the former instrument.

The incision should be 3 inches long, with $\frac{1}{2}$ -inch extending over the symphysis. The muscular walls of the bladder must be reached by careful dissection, a matter of some difficulty in fat subjects; when reached, should be forthwith perforated near the upper angle of the wound by a handled needle armed with a long piece of strong silk. The needle being withdrawn, the silk is temporarily held by an assistant. The bladder is punctured with the point of the scalpel, immediately above the symphysis, the incision being prolonged upwards for about

two inches. The silk being dragged out of the bladder wound, is divided in the middle; each lip of the bladder wall is thus held by a loop, the two ends of which are clamped by Wells' forceps. The bladder cavity should not be explored until thus fixed, and care should be taken that a sufficient portion of the muscular wall, to preclude risk of tearing out, is grasped by each suspensory ligature.

The lips of the wound in the bladder being now sundered as widely as possible by Mr. Bruce Clarke's three-bladed speculum, the necessary manipulations are conducted upon the same principles as those already noted. The galvanic *écraseur* is the most suitable instrument for the excision of malignant growths, combining the two desiderata of removal with cauterisation of the pedicle or base. The tumour should be grasped by Thompson's forceps, or vulsella, and drawn forwards. It is sometimes more convenient to grasp the base with curved forceps, and to excise the tumour upon this as a clamp, with the blade of Paquelin's thermo-cautery. Good electroscopic illumination is an essential. A pedunculated or villous growth may be torn off by forceps; but its base should be cauterised when the hæmorrhage has been arrested.

Resection of portions of the bladder-wall has been practised, usually with disastrous results. Sonnenburg, of Berlin, excised the entire bladder of a woman aged sixty, with the exception of the posterior wall, trigone, and sphincter. The patient survived "a few weeks" (*Berlin Klin. Wochenschrift*, 52, 1884). Antal (*Centralblatt für Chirurgie*, Sept. 5, 1885) removed a third of the organ from a man of sixty-one. The man was able to hold his urine seven weeks afterwards, but the final result is unknown. Many such attempts have proved immediately fatal.

Little good can be effected by operation in the case of sessile malignant disease, a condition which implies infiltration of the sub-mucosa, probably of the entire wall. Free application of the thermo-cautery best checks the cell-growth and alleviates the symptoms, while involving the minimum of risk. The part should on no account be scraped.

In the case of pedunculated tumours, the prospects of successful eradication are favoured by the general principle

that free growths from a mucous surface have relatively little tendency to produce metastases in lymph-glands or viscera. Better results from vesical surgery in the future may be hoped for by a more general recognition of the very faint and uncertain line of demarcation between malignant and non-malignant "papillomata"; by a more free and more constant resort to cauterisation of the base in the case of all such tumours.

The supra-pubic incision is only necessary in the female when a large growth occupies the bladder. The operation is much more difficult than in the male on account of the trouble in procuring distension of the bladder. The organ is often much contracted, sunk deeply below the pubic symphysis, difficult to reach, and to suture to the abdominal walls; urinary infiltration into the sub-pubic connective-tissue is apt to ensue with sloughing. In one successful case by Guyon (Albarrañ, *Tumeurs de la Vessie*, Case 44 in table), the supra-pubic incision was resorted to, subsequently to urethral dilatation.

Professor Guyon, who has had remarkable success with the supra-pubic operation, has introduced important modifications. The most valuable is the *syphon-tubes* for drainage (Albarrañ, *op. cit.*, 326). It consists of two india-rubber tubes of large calibre, welded together for several inches at the curved bladder-end, the distal extremities being free. The length is 50 centimètres; the calibre of each about 14 millimètres. The instrument is passed into the bladder when the suturing of the muscular walls is nearly completed, sutures being placed both above and below the tube. A test-current of warm boracic lotion is then injected through one of the tubes, which returns through the other when the passage is unobstructed.

Guyon sews the abdominal wall by sutures in successive layers; first the muscle-fibres are brought together, then the aponeurosis; lastly, the skin and sub-cutaneous tissue. All the sutures here are passed above the drainage-tube, the lower angle of the wound not being closed. The tube is lastly fixed to the skin by loosely knotted horsehair passed between the thighs, and the urine received in a vessel under the bed.

The next subsequent dressing does not usually take place

until the fourth or sixth day, at which late period "le pansement n'est pas même mouillé." The tube is then withdrawn, a soft india-rubber catheter (self-retaining) being introduced by the urethra.

Of cases treated by the supra-pubic operation on these lines, Prof. Guyon reports: Of benign (?) polypi, 36 cured, 9 *recurrent*, 3 fatal; total 48. Of cancers, cured 23, recurrent 31, dead 43; total 97 (Albarran, *op. cit.*, p. 400).

For *palliative* purposes, a supra-pubic incision in the male, with permanent drainage by Guyon's tube, may afford considerable relief. The bladder cavity can then be efficiently washed out from time to time, and the continuous straining efforts at micturition are obviated.

The administration of *opium*, whether by the respiratory tract, mouth, or rectum, is the sheet-anchor of all palliative treatment by drugs. It may often be usefully combined with *oil of turpentine* to check the invariable hæmorrhage, and also to preclude decomposition. A *hot hip-bath* is occasionally useful.

II. The Prostate and Kidneys.

Species.—Primary malignant disease of the Prostate is very rare; two cases of *carcinoma* are reported by Messrs. Stonham and H. Fenwick in the *Path. Trans.*, xxxix., the ages being fifty-six and fifty-seven years respectively. The vesiculæ seminales may become secondarily implicated (H. Fenwick, *ibid.*, xxxviii.). *Sarcoma* may arise in the capsule or interstitial connective-tissue; *myo-sarcoma* in the muscle-fibre; rarely *epithelioma* in the mucous lining of the duct. These growths are prone to mucoid degeneration; hence cases of colloid cancer and of "mixed" myxoma. Many obscure lesions are evidently of the *blastoma* order. The organ is frequently invaded secondarily by malignant disease arising in the bladder, or in the pelvic lymph-glands.

The Kidney may develop cancer of three species, respectively derived from its glandular parenchyma, non-striated muscle, and connective-tissue (*carcinoma*, *myo-sarcoma*, *sarcoma*). Such terms in medical reports as "angio-sarcoma," "adenosarcoma," "sarcoma carcinomatodes," "myxo-sarcoma," bear witness to the difficulty of classifying the tumours, and also to

the amount of degeneration present in these bulky masses. In the adult, the secreting epithelioid cells are apparently the most common source; in the child, the kidney shares in the proclivity to malignancy shown by all organs derived from the Wolffian body. Tumours of the latter group have not yet been sufficiently differentiated from the former; a few only of the rarest have received a distinctive title, as "Rhabdo-myomata." Dr. David Newman (*Surgical Diseases of the Kidney*, 388) cites ten cases of "primary spindle-celled sarcoma."

From the vascularity of the kidney and the slight resistance presented by its capsule, the malignant process assumes a very *acute* form, rapidly advancing and producing huge soft cell-masses, quickly fatal.

Lympho-carcinoma, beginning in the lumbar glands, may implicate the kidney secondarily; that species cannot primarily attack the organ. Many cases of so-called "sarcoma" in young children are derived from a vestigial source,* and are therefore analogous to rhabdo-myoma (see p. 149, and Appendix A.).

Causes.—In the Prostate, the irritation of residual urine appears to be the main cause of malignancy. Rarely there is a history of accident. Any source of chronic congestion may be the excitant. In the *Path. Trans.*, xxviii., Dr. Sidney Coupland has recorded a case of prostatic carcinoma with metastases in the pancreas, and an adrenal; consequent upon gonorrhoeal cystitis, in a young man of twenty-nine.

In the Kidney, the symptoms of cancer follow either mechanical injury or the continuous irritation of a calculus, or severe mental trouble; and this occurs at or after middle-age. All cases under seven should rank in the congenital class (*Blastoma*).

Age.—Of Primary cancer of the PROSTATE, Dr. Sidney Coupland quotes six cases (*Path. Trans.*, xxviii.) shown before that society. The youngest patient was 42, the oldest 70; one at the early age of 19. Of 24 cases collected by Oscar Wyss,

* Dr. Windle (*Journal of Anatomy and Physiology*, xviii. p. 166), in a very valuable paper, tabulating forty-one cases of "Primary Sarcoma of the Kidney," with varying microscopical structure, remarks on the congenital origin "of many, if not of most."

and referred to in Dr. Coupland's paper, 35 per cent. occurred at *ætat.* 9-10: 10 per cent. *ætat.* 40-50: 30 per cent. *ætat.* 50-60 and 70-80: 10 per cent. at *ætat.* 80-90.

Sex in Renal Cancer.—Males appear slightly more liable than females to cancerous growth in the kidney in both the periods of life at which these prevail—old age and infancy. Of patients with miscellaneous forms of cancer, Roberts reports 47 males, 19 females; 24 of these were children—15 boys, 9 girls. Ebstein met with 56 adults—38 male, 18 female; with 15 children—8 male, 7 female. Lebert places the proportion of males to females as 7 to 4; Rosenstein as 22 to 13. On the other hand, Dr. Windle (*loc. cit.*) gives 34 cases of primary "sarcoma," microscopically examined—14 were in the female, 16 in the male; one, not so verified, occurred in a premature infant. Of his 11 rhabdo-myoma cases, 7 were in male, 2 in female, infants, with 2 of sex not reported. Dr. David Newman (*Lectures on Surg. Dis. of Kidney*, p. 395) has operated on 20 females, 10 males with "sarcoma" of the kidney.

Site of Renal Cancer.—Among Dr. Windle's 34 cases of "sarcoma" the left kidney was the seat in 12, the right in 10, both in 10; with 2, side not stated. See further analysis at p. 360. The bilateral cases must necessarily have been of congenital source.

Age in Renal Cancer.—Cancerous lesions of the kidney may be specially looked for before the age of 5, and after that of 40. Dr. D. Newman (*op. cit.*) quotes 53 cases from his own practice; 12 occurred before the age of 5, 3 at *ætat.* 5-10, 4 at 20-30, 11 at 30-40, 10 at 40-50, 10 at 50-60, 3 at 60-70. He gives (p. 359) a table of 126 from other sources, whereof 48 per cent. occurred in children under 10 years of age, 33 per cent. at *ætat.* 40-70, only 19 per cent. at *ætat.* 10-40. Of 31 tabulated in Dr. Walshe's work, 21 occurred above the age of 50, 7 between 20 and 50, only 3 under 20 years.

Symptoms.—In the prostate, the symptoms of ordinary hypertrophic enlargement gradually merge into those of cancer. An old man who has previously suffered from difficult micturition, muco-purulent urine, occasional hæmaturia, &c., feels

weight and pain at the neck of the bladder, soon passing into severe continuous aching in the loins and thighs. There is great vesical irritability, and the general health conspicuously fails; all the symptoms become rapidly exacerbated. On rectal examination, the prostate is found hard, enlarged, and very tender on pressure. Hæmaturia is nearly always severe and continuous. Marked and rapidly progressive failure in physical vigour, with pain and local tenderness, are the chief elements distinguishing cancer from the common non-malignant ailments of old age.

In the kidney, a tumour tender on palpation, rapidly grows to an enormous size; one of 40 lbs. has been recorded. Concurrently there is extreme and progressive emaciation, physical weakness, and "cachexia." The mass is at first wholly painless; later, there is a local continuous ache, with intermittent "neuralgic" darts, widely radiating from the diseased part. While retained in the capsule the growth may seem hard and ovoid; or the envelope quickly yields, and the mass appears soft and semi-fluctuating; lastly, many cases have been mistaken for cysts, ovarian or otherwise. Sometimes the tumour is lobulated. When the right kidney is attacked, jaundice may follow, and the lesion be regarded as of hepatic origin; when the left, the disease may be referred to the spleen. The parenchyma quickly blends with that of adjoining organs, and occasionally perforates large veins. From the marked anæmia, combined with the consequences of pressure on the vena cava, the lower extremities become œdematous. When calculi are the source, as in many cases reported, the pain and attacks of renal colic associated with these gradually merge into the symptoms of cancer.

In a few exceptional instances hæmaturia is absent. There is commonly a profuse muco-purulent sediment in the urine, and in most cases considerable vesical irritation; hence, unless the loin be examined, the symptoms may be referred to the bladder. Among the pressure-effects are vomiting, dilated veins in the skin, œdema of the lower extremities, constipation. Life ends in from eight months to two years. For case of carcinoma in a woman aged twenty-eight, in which the origin of the cancer-cells from the secreting epithelium of

the Malpighian tufts is demonstrated, see *Path. Trans.*, xxxiii. (Dr. Seymour Sharkey).

Treatment.—Prostatic cancer admits of palliative treatment only. *Opium*, in the form of suppositories, and hot hip-baths, are specially indicated. The bladder symptoms, always consecutive, may be alleviated by a supra-pubic incision, as previously described.

Renal tumours have not hitherto been diagnosed as malignant at a sufficiently early date for radical excision. Should operation in a curable stage be feasible, an abdominal incision directly over the diseased organ will alone permit its removal, together with that of the infected lymph-glands near. The measure is but a forlorn hope, and is not one to be undertaken lightly. Of sixty-one nephrectomies quoted by Newman, thirty-three died from the effects of the operation, and there are no statistics of permanent immunity in the twenty-eight who survived. Internally, the continuous administration of *cucaine* is highly beneficial; with occasional doses of *anti-pyrine* to subdue neuralgic pain. *Opium* is necessarily contra-indicated.

CHAPTER XI.

THE EYEBALL.

Varieties.—The most prevalent form of cancer is *melanotic sarcoma*, derived from the pigmented connective-tissue corpuscles of the uveal tract.

Ordinary *spindled-celled sarcoma* may arise in the non-pigmented connective-tissue. *Gliomata*, of congenital derivation, are developed in the retina of young children (pp. 125, 349).

More rarely the conjunctival epithelium may originate *epithelioma*, and the endothelial lining of Descemet's membrane of the iris and ciliary processes, *endothelioma*. The obscure "plexiform sarcoma" of Billroth seems to belong to the latter class. On *carcinoma* within the eyeball, see p. 330.

Rodent ulcer attacks the hair-follicles of the eyelids (preferentially the lower), and secondarily implicates the eyeball.*

Age.—Messrs. Lawford and Collins (*Ophthalmic Hospital Reports*, vol. xiii. December 1891) publish an analysis of 103 cases of "Sarcoma of the Uveal Tract." The average age of these was 48.42 years: 3 occurred at *ætat.* 10-20; 7 at *ætat.* 20-30; 19 at *ætat.* 30-40; 27 at *ætat.* 40-50; 22 at *ætat.* 50-60; 16 at *ætat.* 60-70; 8 at *ætat.* 70-80; 1 at *ætat.* 80-90. The youngest was a girl of 15, the oldest a man of 84.

The average age of Fuchs' 259 cases cited in same paper was 44.2; of Freudenthal's, 49.4 years.

* Lymph-follicles are abundant in the conjunctiva of some mammals; and a few have been described in that of the human eye. Hence it is possible that *lympho-carcinoma* may sometimes arise in the latter; but cases in proof are wanting.



Of 25 cases of *retinal glioma* (Berry, *Diseases of Eye*, 1891), 3 were congenital, 6 were discovered in the first year, 5 in the second, 3 in the third, 2 in the fourth, 1 in the fifth, seventh, and eighth years respectively. The disease has been met with up to the age of 12 years.

Sex.—Of Messrs. Lawford and Collins' 103 sarcoma cases, 59 were in males, 44 in females. Fuchs (referred to in same paper) reports 137 cases in the male, 116 in the female, total 259. Martin gives 14 males, 29 females, of a total 43.

Of Pflüger's 23 cases of primary sarcoma of the *iris*, 8 were male, 15 female. In 17 ditto by Treacher Collins, 10 were female, 7 male (*loc. cit.*). Six sarcomata of the ciliary body in Messrs. Lawford and Collins' list were equally divided between the sexes; they quote 17 by Mules, 14 female, 3 male.

It thus appears that when the figures considered are sufficiently large, the two sexes are about equally liable to sarcoma of the eyeball: with a slight preponderance in men, probably to be accounted for by greater exposure to mechanical violence.

Site.—Lawford and Collins report the *right eye* to have been attacked in 41 cases, the *left* in 60; total 101. Fuchs' figures are, *right eye* 108, *left* 101; total 209. Martin, *right* 15, *left* 19; total 34. Freudenthal, *right* 10, *left* 14; total 24 (*loc. cit.*). As might have been anticipated, both eyes thus appear equally liable to cancerous developments.

Six of 103 cases (Lawford and Collins) began, so far as could be ascertained, in the *ciliary body*; 1 in the *iris*, 2 in the *choroid* and *ciliary body*; 94 began in the *choroid*, behind the ciliary body. Martin, of 43, ascribes 38 to the *choroid*, 4 to the *ciliary body*, 1 to the *iris*. Fuchs, 221 to the *choroid*, 22 to the *ciliary body*, 16 to the *iris*.

The *choroid coat* behind the *ciliary body* is thus the most frequent site of malignant disease attacking the uveal tract.*

Causes.—Of superficial lesions (rodent ulcer and conjunctival epithelioma), *continuous irritation*.

Those of intra-ocular sarcoma seem rarely to have been

* Of 19 cases referred to in Messrs. Lawford and Collins' very valuable paper, the cells are said to have been spindle-shaped in 8, mixed in 5, round in 5, oval in 1. All were more or less pigmented.

investigated in the cases recorded. Many followed a *blow* or *fall*, and the analogy of sarcomatous growths in other parts, points to *traumatism* as the usual cause.

Retinal glioma stands apart, both clinically and pathologically, from all other forms of the malignant process connected with the eyeball. The restriction of this malady to childhood, its occasional inception *in utero*, the frequency with which two or three children in the same family are attacked, the parents being healthy, the simultaneous development in both eyes which has been found occasionally to occur, the absence of any history of injury, are considerations which all point to origin from foetal residua; analogous to the unobliterated traces of the Wolffian body, and like structures referred to in Appendix A.

Their limitation to childhood differentiates gliomata of the retina from microscopically similar tumours in the brain or spinal cord of adults. Their tendency to extend *secondarily* to the opposite eyeball *per* the optic chiasma, is a clinical feature of note. I have not met with or heard of an instance of this occurrence with any other ocular malignant growth.

Diagnosis.—From tension of the sclerotic, severe *pain* attends the early stages of intra-ocular sarcoma; and a tumour is readily recognised by the ophthalmoscope, the pearly-white colour of retinal gliomata being pathognomonic of that condition.

The bulk of these tumours in later life are *melanotic*, although the amount of pigment present is very variable. Advancing age, a history of injury, or of prolonged mental distress, will suggest the presence of cancer.

Treatment, with general remarks.—Sarcomatous growths of the eyeball, melanotic or otherwise, are highly acute forms of cancer, rapidly producing multiple metastases in the brain, spinal-cord, bones, thoracic and abdominal viscera, subcutaneous tissue, lymph-glands, &c. The organs last mentioned are seemingly implicated by way of the blood; their enlargement is synchronous with general dissemination by that vehicle, and with the physical signs of visceral disease. The brain is the first recipient of infection *per* the optic nerve and its sheath. Hence, after extirpation of the organ as early as possible after the appearance of the disease, it is necessary to

cauterise freely the stump of the nerve with Paquelin's instrument.

Provided that the sclerotic coat is intact and the whole disease is comprised therein, little danger resides in any other part of the orbital cavity. The zinc-chloride, traditionally resorted to in these cases, is, in dilute solutions, useless; in the stick-form, or in "paste," efficient, but unnecessarily painful and barbarous.

Unless invoked before the infection has extended to the cerebral substance, or to the general circulation, surgical treatment can be palliative only. The presence of lymph-gland enlargement indicates that relief will be but transient.

The question of resort to palliative surgery is here on a somewhat different footing from what appears in cases of like disease elsewhere. Ocular tumours are *acutely painful in the early stage*; in the later, when the sclerotic has become eroded and cell-growth is unrestrained, they often cause little or no suffering, however unsightly the appearance of the patient. In most malignant tumours of other regions, the reverse is the case. The lax integument of the eyelids lends itself to an enormous degree of distension, without uneasiness, and without ulceration; in cases of recurrent sarcoma, when the eyeball has been removed, a prominent mass as large as a child's head may be found, painless, and with the covering skin unbroken. With such a condition, there are always metastases in distant organs.

Hence, however ghastly-looking these huge ocular tumours may be, and however a natural impulse may prompt surgical interference, it must always be matter of anxious consideration whether real benefit can be anticipated therefrom. Whether, on the other hand, the anaesthesia, hæmorrhage, mental anxiety, shock, may not tend to accelerate cell-growth already established in the viscera. Careful examination of the *liver* and *lungs*, as the two parts most liable to infection, must be instituted before an operation can be thought of; evident deposit in these, or in the lymph-glands, negatives any operative interference whatever.

Should a palliative excision be decided upon, it must be performed by a *cauterising* instrument. The operative treatment of retinal glioma is unfavourable, but not entirely hopeless. Of

4 cases by Nettleship, 1 certainly, and 1, probably, received a permanent cure; of 23 by Horner, 16 died, and 4 were permanently freed; of 11 by Da Gama Pinto, 2 recovered without reappearance. In 1 case recorded (by Agnew) complete cure followed removal of both eyes, the infiltration having thus apparently not extended *per* the *optic chiasma* (Berry, *op. cit.*).

Very little, if any, advantage is ever procurable by operative interference with either retinal glioma, or with sarcoma of the uveal tract, when "recurrent." There is always, by that time, a general blood-dissemination, and harm is done by subjecting the patient to the depression of further operative treatment. Hirschwald tabulates 77 cases of recurrent retinal glioma, in which second operations took place; all were unsuccessful.

The *glands of the ciliary body* have been described by Mr. Treacher Collins as a source of new-growths (*Trans. Ophth. Soc.*, 1891); and a primary carcinoma owning this source is further reported by MM. Badal and Lagrange in the *Archives d'Ophthalmologie*, March 1892.

Mr. Bendelack Hewetson (*Brit. Med. Journal*, Oct. 15, 1892) alludes to a special preponderance of infantile glioma in a particular district between Leeds and Bradford, where the inhabitants are of Flemish descent; a highly suggestive racial or geographical proclivity, bearing significantly upon many similar congenital aberrations, should the statement be substantiated.

CHAPTER XII.

THE LYMPH-GLANDS, TONSILS, AND "ADENOID" TISSUES IN GENERAL.

Species.—The "lymphoid" or "adenoid" tissues develop a variety of cancer, here described as *lympho-carcinoma*. (See p. 150, and Plate VI.).

Site, and General Remarks.—The *lymph-glands* (compound lymph-follicles) in surface regions of the body are the parts which in surgical experience most often produce cancer of the species referred to. Next in relative liability, stand the *tonsils* and the cavity of the *pharynx*. As these structures are most exposed to traumatism, it is probable that their apparent proclivity is also real. Owing, however, to the uncertain manner in which lympho-carcinoma has hitherto been differentiated, to its confusion with sarcoma, and with Hodgkin's disease (lymph-adenoma), no reliable data upon the point are forthcoming.

Cancerous growths in the Tonsils mainly rank in this division, but *epithelioma* occasionally commences in the surface-epithelium, and true *carcinoma* may attack, though very rarely, the mucous glands. Situated at the inner orifice of the second bronchial cleft, the organ is apt to include vestigial remnants, which may eventually develop malignancy. The tumours thence resulting, often of mixed and obscure composition, have been variously designated "cysts," "adenomata," "adeno-sarcomata," "encysted epitheliomata," or even as "sarcomata" pure and simple. Such are referred in Appendix A. to the *Blastomata*.

Within the thorax, lympho-carcinoma may be developed within the numerous lymph-glands of that cavity, but most commonly from the vestigial Thymus (see note, p. 155).

It may be noted that when lymph-glands near the surface become cancerous, nature makes a slight attempt at inhibitory localisation. A sub-acute inflammation often appears to take place; thereafter the diseased organ is found matted to others adjoining by superabundant and tenacious fibrous tissue. The infection, however, very quickly extends to other glands near; thence to more distant ones; lastly to the blood-current, and so to the viscera. The number of enlarged lymph-glands scattered over the body is often very considerable, as though the metastatic cell-particles flourished more luxuriantly in this particular soil. Diffusion by means of the lymphatic system is also aided by regurgitation of lymph-currents, consequent upon the blocking up of normal channels (p. 70).

The irritative process alluded to results in a slight temporary hypertrophy of the gland-envelope, which becomes blended with the surrounding connective-tissue, so as to constitute a *quasi-capsule*. The density of this varies with the seat of the disease, with the condition of the normal tissues, and with the relative chronicity or acuteness of the individual case. In the more rapid, there is little or no attempt at encapsulation; the fibrous envelope is quickly eroded, and dissemination through the sub-cutaneous tissue ensues. Multiple tumours under the skin are a common feature of the disease, when arising in superficial lymph-glands.

Organs or tissues intimately associated with the lymphatic system, such as the Supra-renal bodies, and the Serous sacs, are a frequent site of metastases. I have not met with an instance of Marrow-infection.

When the capsule of a lymph-gland attacked by malignant disease does not undergo inflammatory thickening, and no tension results, the characteristic hardness usually associated with cancer in any shape may be entirely wanting. The tumour resulting may be moderately firm to the touch, or even soft and elastic.

Differentiation.—From other cancer-species, lympho-carcinoma will be distinguished macroscopically by inception in a lymphoid organ or tissue; microscopically, by the relatively small cells, with scanty residual stroma, and without admixture

of spindle-cells depicted in Plate VI. The rapidity with which they infect adjoining lymph-glands *per* the lymphatic vessels, serves to distinguish them from sarcomata. They usually grow more rapidly and exuberantly than new-growths of the connective-tissues; more quickly generate blood-infection, and implicate distant organs. Lympho-carcinoma is one of the most acute forms of cancer, proving fatal in two years, often within the twelve months.

From carcinoma the preference of the secondary metastatic deposits for tissues of the same character as that in which the disease began, often, but not always, serves to distinguish the variety in question. Thus, numerous lymph-glands in the neck, groins, axillæ, &c., are found to be quickly implicated by a lympho-carcinoma primarily developed in a single gland. Unless the history be carefully investigated, the cancerous malady may be mistaken for the pyrexial disorder known as Hodgkin's.

The distinction between the rare lesion, which unfortunately has hitherto shared with Lympho-carcinoma the common designation "lymphadenoma," and the latter, has been already noticed (p. 154).

Age.—Lympho-carcinoma follows the usual rule of cancer-age. Of 24 cases occurring in the lymph-glands (see p. 357), taken partly from Cancer Hospital records, partly from my private note-books, 13 occurred at ætat. 50–60; 6 at 40–50; 3 at 60–70; with 1 at 26, and 1 at 29 years of age.*

Sex.—In the table at p. 26, the Lymph-glands were primarily attacked by cancer in 10 men, 6 women. Of the cases above, $\frac{19}{24}$ were in men, only 5 in women. Of 12 cases of malignant growths in the Tonsil tabulated by Mr. Butlin (*Sarcoma and Carcinoma*) all but one occurred in males. Of 14 cases of "Primary Cancer of the Tonsil Glands," collected by Mr. Poland (*Med.-Chirurg. Review*, 1872), in which the sex is specified, 10 were in men, 4 in women. The figures are too small for reliable inference. The disease is rare; of 9118 deaths from cancer at Paris during the years 1830–40, reported by Lébert, only three were referred to the tonsils. I have met with two or three in women,

* See also my published lecture, "The Lymphatic System in Cancer": *Provincial Medical Journal*, April 1892.

but cannot recollect a single instance in the male; with the exception of the "recurrent" case at p. 337 (No. 11).

Glands Attacked.—In $\frac{20}{24}$ the *cervical* lymph-glands were the primary site of cancer; those of the *right axilla* in 3; of the *left groin* in 1. Of those first mentioned, the lesion was on the *right* side of the neck in 10, *left* in 8, with 2 not recorded.

Causes.—Of lympho-carcinoma commencing in superficial lymph-glands, either *mechanical violence* or *muscular strain*; hence the preponderance of males in the list above. In five of these cases the development appeared within a few weeks of a blow or fall, in three it followed some violent exertion; in seven the patients were bricklayers, farmers, or followed some like occupation involving liability to casual strains or sprains. The causal association was emphasised by the onset of the disease in the vicinity of the muscles specially used. Thus of four cervical cases, one patient was a bricklayer, the other three had been in the habit of carrying heavy weights on the corresponding shoulder; of three axillary, one patient "moved heavy irons" when at work; one was a brass-finisher, the third ascribed his complaint to a fall over an iron girder.

Simple *inflammatory enlargement* from septic absorption, &c., appears to predispose: one of the above cases had been preceded by severe diphtheria three years previously; another (*inguinal*) followed old-standing eczema and ulceration of the leg; a third immediately followed an abscess "lanced and kept open for three weeks."

Of malignant lymphoid new-growths within the body, there is generally a history of health previously impaired by *prolonged trouble*, or some similar neurotic cause; often with *traumatism* in addition; though it is not always easy to obtain a satisfactory account of the patient's antecedents. Mental wear and tear always appears to *predispose*, whether the cancer be internal or external.

Diagnosis.—Probably no malignant disease is more often mistaken for a trivial affection, and erroneously treated on that supposition until cure has become impossible, than is primary cancer of the lymph-glands. I have rarely met with a case which had not, for weeks or months, been regarded as

one of simple Lymphoma, and in which the tumour had thus been sedulously painted with iodine, &c. The infection very rapidly extends to other lymph-glands, near and far. Tentative measures, such as that indicated, serve conclusively to sacrifice every chance of life.

Although both the benign and the cancerous forms of lymph-gland enlargement similarly commence, as rounded, painless "lumps," there is, in the majority of instances, slight excuse for an erroneous diagnosis. The key-note of accurate recognition is the marked difference in *relative susceptibility to irritative enlargement exhibited by these organs, at late and at early periods of life*. In the young, simple lymphoma is a common condition; in the aged or elderly, it is only met with exceptionally.

In an individual of forty years old or upwards, progressive increase in bulk of a lymph-gland, or group of glands, is *primâ facie* cancerous, *unless obviously produced by some septic cause* (suppuration, syphilis, diphtheria, &c.), acting upon the tissues in the vicinity.

Should well-grounded suspicion of a malignant development arise, an *exploratory incision* must be resorted to, at the earliest possible moment, as affording the only prospect of escape.

A history of mechanical *injury*, or of muscular *over-strain*, as the immediate antecedent, will, in the old, point strongly to cancer. A certain number of the patients have an anxious, worn-out appearance, and give an account of *trouble, anxiety, or chronic ill-health*.

The influence, however, of *neurotic* agencies is not so direct, constant, and conspicuous as with malignant lesions of the female sexual organs; and the organs here in question are not, like the tissues of the mammæ and uterus, undergoing a special process of devolution, when the cancer-process commences.

For the diagnosis from lymphadenoma (Hodgkin's disease), see p. 154.

Lympho-carcinomata developed in the tonsils, in the internal lymph-glands, or in other collections of "adenoid" tissue, are easily recognisable as malignant on general grounds, though their precise pathological rank may not become clear until a microscopic examination becomes possible.

Treatment.—Free extirpation, not only of the parts obviously diseased, but of all those lymph-glands in the “infection-tract” which can be safely reached, is the treatment demanded by this acute form of the cancer-process, when attacking structures amenable to the resources of surgery. Such a measure is feasible only within a very few weeks of inception. With a new-growth of any size, excision can be palliative only.

The radical extirpation of lympho-carcinomata in the Tonsil is favoured by their development on a free mucous surface, so that infection of the neighbouring lymph-glands follows less readily. In the earlier stages, the tumour is often partially encapsuled, and can be “shelled out” with ease.

In more advanced cases, a preliminary laryngotomy will afford a more favourable field for the requisite manipulations. The situation of the cancer indicates resort to excision, as a merely palliative measure, whenever an operation is feasible. There will usually be profuse hæmorrhage; a supply of stick-sponges, enveloped in iron-lint, should be in readiness. In health, the tonsil is only about one-third of an inch (four-fifths of an inch, Treves?) from the internal carotid. The arteries which supply it are the ascending pharyngeal branch of the external carotid, the dorsalis, lingual, tonsillar, descending and ascending palatine. Under the influence of cancer, all these are dilated, and the normal relations of the organ materially altered. It may be needful to first place around the common carotid a loose ligature which can be tightened at will, as suggested by Mr. Treves.

In cases not permitting any loss of blood, the more prominent and obstructive portion of the tumour may be removed with the galvanic *écraseur*. Life can be subsequently prolonged by *opium*, combined with rectal alimentation, the use of pre-digested foods, and *cucaine*.

To indicate the ordinary mode of causation of lympho-carcinoma, and the conditions under which this cancer variety may be looked for, a table of the twenty-four cases above referred to, is here appended. All are assignable to lymph-glands, more or less superficial. Not to introduce any element of error, examples of “lympho-sarcoma” ascribed to the internal lymphoid tissues, or even to the

tonsil, are excluded. Case 11, reported in the *Lancet* of June 7, 1890, presented the peculiar phenomenon of a primary growth in the right axilla; with subsequent "recurrence" in the left tonsil, proving fatal 6½ years after the removal of the former.

Case 1. Male, aged 55. Glands on left side of neck. Blow from cow's horn one month previously.

Case 2. Male, aged 57. Glands on right side of neck. Cause not recorded.

Case 3. Male, aged 57; bricklayer; carried heavy loads on shoulder. Right cervical glands.

Case 4. Male, aged 55. Left side of neck; weights carried on shoulder.

Case 5. Female, aged 64. Left side of neck. A careworn woman, with history of long trouble. The symptoms came on after an abscess, "lanced and kept open for three weeks."

Case 6. Male, aged 44. Right side of neck. Attributed disease to "strain after carrying an Australian quarter of beef."

Case 7. Male, aged 55. Right axillary glands, due to "fall over iron girder" when at work.

Case 8. Male, aged 46. Right side of neck. Complaint ascribed to lifting heavy weights.

Case 9. Male, aged 42. Left side of neck. History of strain; and of chronic alcoholism.

Case 10. Male, aged 56. Left side of neck. No injury ascertainable. Previously out of employment for a year.

Case 11. Male, aged 62. Glands in right axilla. Brass-finisher. Strain at work.

Case 12. Male, aged 52. Left side of neck. Cause not stated.

Case 13. Male, aged 54. Right axilla. "Works with heavy irons."

Case 14. Male, aged 59. Right side of neck. Says no injury; much mental distress.

Case 15. Female, aged 26. Right side of neck. Enlarged glands of four years' duration, have developed malignant symptoms within previous year.

Case 16. Male, aged 63. Left side of neck. Cause not recorded.

Case 17. Male, aged 58. Left side of neck. Fall on head, followed by "stiff neck."

Case 18. Male, aged 54. Right side of neck. Followed "knock against a shelf."

Case 19. Male, aged 29. Right side of neck. A history of tumour, painless and soft, in neck for seven to eight years. Was punctured three months previously at a provincial hospital, when "only blood came out"; since then, pain and rapid increase.

Case 20. Female, aged 40. Glands in neck, side not recorded. Fall one month previously to appearance of growth.

Case 21. Male, aged 52. Right side of neck. Farmer; history of trouble and anxiety.

Case 22. Male, aged 42. Right side of neck. Publican. Three

years previously, severe diphtheria with relapses. The present disease immediately followed a bad cold. Much pecuniary anxiety.

Case 23. Female, aged 42. Left side of neck. Much trouble; no history of any injury.

Case 24. Female, aged 59. Left groin. Farmer's wife. Hard work on farm, lifting heavy articles. The left leg is ulcerated and eczematous; a condition consequent upon phlegmasia dolens many years previously.

CHAPTER XIII.

CANCER IN THE REMAINING THORACIC AND ABDOMINAL VISCERA, THE BRAIN, SPINAL CORD, ETC.

General Remarks.

THE liver and lungs are, of all visceral structures, the most frequent recipients of metastatic cancer deposit. The fact is usually accounted for by the relatively small calibre of their capillaries, involving the local retention of malignant cells or cell-particles circulating in the blood as emboli.

It is also promoted by the extreme vascularity of these organs, and so by the actual *quantity* of the blood which they relatively receive.* Thus, of 33 cases of Melanotic cancer, which, whether epithelial or sarcomatous, always involves very wide dissemination, the liver received secondary metastases (*i.e.*, in macroscopic form) in 18, the lungs in 17 instances. Various BONES were the seat of obvious disease in 13 (cranium 5, ribs 4, clavicle, femur, sternum, antrum, each 1). The *lymph-glands* were infected in 11; the *subcutaneous tissue* of the limbs or trunk in 10. Secondary nodules occurred in the *heart* in 9; in *brain, pancreas, kidneys*, each 7; *sexual organs*, 5; *sub-serous tissue of cavities*, 5; *spleen*, 3; *supra-renal capsules, fibrous membranes, thyroid body*, each 1. (Pemberton, *op. cit.*)

Among 61 cases of breast-cancer, tabulated by Mr. Sibley (*Med.-Chir. Trans.*, xlii.) there was secondary deposit in the

* The latter explanation is probably the valid one. Were metastatic infection due to relative size of capillaries, the brain would be the most common recipient. Weber has there noticed some $\frac{1}{16}$ th of an inch in diameter; the average being from $\frac{1}{32}$ th to $\frac{1}{16}$ th in other parts.

liver in 33 instances; *lungs*, 13; *pleura*, 17; *pericardium*, *peritoneum*, *opposite breast*, 9; "very numerous nodules under the *SKIN* in 8; "extensive cancerous deposit in the *BONES*," 6; *arachnoid*, 2; *supra-renal capsules*, 2.

In 44 of uterine cancer, the *liver* contained metastases in 7, *pleura* in 2, *pericardium* in 2; *lungs*, *kidney*, *peritoneum*, *ovaries*, *intestines*, each in 1.*

The rarity of *primary* malignant disease in the important viscera referred to strikingly contrasts with the common occurrence of secondary. Authentic instances of "primary cancer of the Lung" appear to be unknown.† The cases so reported are generally referable to the classes *lympho-carcinoma* or *blastoma*. The tumours, ordinarily huge masses of small-celled growth, have seemingly originated either in the vestigial thymus or in the lymph-glands of the mediastina, and the lung has then become secondarily infiltrated.

Tumours containing cartilage have been found within the lung-substance, and have been referred to the presence of that tissue in the tracheal rings; they may, on the other hand, have been vestigial. It is possible that in rare cases a malignant process may originate in the diffuse adenoid tissue or lymph-follicles of the trachea and bronchi (*lympho-carcinoma*), in the connective-tissue (*sarcoma*), in the epithelium of the bronchi or of their terminal alveoli (*epithelioma*). But the occurrence of such a pathological event is at present hardly more than a mere matter of conjecture.

In the Liver, again, a primary cancer-process is undoubtedly exceptional, and is probably even less often met with than is now supposed. Many cases, so styled, bear *primâ facie* the stamp of a metastatic lesion; such are the melanotic tumours

* It has been erroneously supposed that cancer and tuberculosis are antagonistic. Two of the breast-cases, four of the uterine, in the above list, had also pulmonary phthisis. The man with Rodent Ulcer, referred to at p. 166, died with extensive tubercular deposit; and I have seen many other tubercular males, with lingual or buccal Epithelioma. In Dr. Kingston Fowler's published cases of *Arrested Pulmonary Tuberculosis*, 77 out of 177 were cancerous.

† Ebstein of Göttingen (*Deutsch. Med. Woch.*, Oct. 16, 1890), refers, however, to the great frequency of cancer of the lungs and bronchi amongst workers in cobalt and nickel mines, ascribing the fact to direct irritation of the bronchial mucous membrane.

occasionally found in the hepatic parenchyma. Although the liver is "a glandular organ abounding in cells and richly furnished with blood-vessels," it undergoes no normal process of involution comparable to that which characterises the female special organs; but on the contrary retains, until the death of the individual, its functional activity unimpaired. For this reason, together with its protected position, malignant lesions are uncommon unless conveyed from other parts. Primary *melanotic* disease in particular is almost an impossibility, from the absence of melanine-secreting cells (p. 179).

For case of primary carcinoma in male, aged 42, by Dr. Kingston Fowler, see *Path. Trans.*, xxxiii. There are several by Dr. Bristowe in vol. xi. In *Ibid.* xxxi. is a case narrated by Dr. Pye-Smith; it occurred in a boy of twelve, three months after a fall. The tumour consisted of closely-packed, polyhedral, epithelium-like, nucleated cells, with scarcely a trace of stroma between them. They chiefly differed from the surrounding liver-cells in the absence of the characteristic columnar arrangement. Several masses grew into the hepatic veins; there were metastases in the right lung, but no lymph-gland affection.

Three cases of "Primary Contracting Scirrhus, simulating Cirrhosis," are reported by Dr. Hilton Fagge, in vol. xxviii. Males, aged 52, 46, and 71, were the subjects; one was a gin-drinker. No metastases in glands or viscera were found; apparently the cancer attacked organs already cirrhotic.

In *Ibid.* xxi., is a primary diffuse malignant tumour of the liver, detailed by Dr. Sidney Coupland. It occurred in a woman of 33; the symptoms were acute. A mixed carcinoma and sarcoma structure is described (? Blastoma).

Of metastatic deposits in the liver, more than one-third are, according to Dr. Murchison, consecutive to primary disease of the *stomach*. Of the remainder, many result from cylindroma of the rectum or other portions of the bowel. On account of the mechanism of the portal circulation, the organ is placed foremost in the "infection-path" of cancerous growths here situate.

The Pleura very rarely develops primary cancer, which is usually referred to its endothelial lining (*endothelioma*). Some of these obscure cases may be derived rather from the patches or cords of "adenoid" tissue which occur in the serous membrane, and should then rank with the lympho-carcinomata. In others, the germinating endothelium of the stomata appears to

be the source. The pericardium and peritoneum are exceptional seats of the same pathological variety (see cases at p. 172 *et seq.*).

The Heart is probably never the seat of primary malignancy. Of 45 cases in the *Path. Trans.*, xvi., two are set down as primary; but there is no record of microscopic or other verification.

The Spleen is secondarily infected by cancer in distant parts, *per* the blood; by ditto of near organs, such as the ovary and appendages, kidney, omentum, lymph-glands, *per* the lymphatics. *Per contra*, I have been unable to discover an authentic recorded instance of primary malignancy here. The *Path. Trans.*, xxiv. contains one case believed unique, but extremely doubtful, the disease having probably originated in the mediastina.

The Pancreas is not often attacked by primary *carcinoma*, although it is frequently implicated by malignant disease of adjoining parts. Dr. Norman Moore (*Path. Trans.*, xxxix.) refers some cases to the epithelium of the duct, rather than to the gland-acini. Fatty evacuations are an unusual symptom. Cysts are occasionally found (see Appendix B.), sometimes in association with cancer.

A case implicating the semilunar ganglia is detailed by Dr. Hale White in the *Path. Trans.*, xxxix. Another by Dr. Crisp, in *Ibid.* xiii.; the faeces were clay-coloured, but not fatty; patient a man of 62. I have encountered a single example, the patient being an aged woman in an almshouse; the head of the organ was the site; the faeces were not affected.

The Adrenals, like the spleen, are not seldom infected *per* blood-vessels or lymphatics, by malignant lesions of other parts. They occasionally prove the seat of primary cancer, for the reason that their cortical part being developed in connection with the Malpighian corpuscles at the upper part of the Wolffian body, shares in the tendency to cancer-development displayed by all the derivatives of that foetal organ. The patients are usually young children. Bronzing of the skin does not occur in malignant disease of the adrenals, whether primary or secondary.

Drs. Hale White and Charlewood Turner (*Path. Trans.*, xxxvi.)

report cases of metastatic adrenal deposit, secondary to mediastinal lympho-carcinoma. I have seen several, consecutive to carcinoma of the mamma.

The Gall-bladder with its associated ducts is a rather frequent source of malignancy, which is generally referable to the mechanical irritation of biliary calculi. When either of the ducts is attacked, the disease, according to Dr. Norman Moore, may readily be overlooked, unless a microscopic examination takes place (*Path. Trans.*, xxxix., two cases). The liver is probably occasionally credited with cancer here originating. The secreting cells of the mucous glands generate *carcinoma*; the mucous lining of the ducts, *epithelioma*. Dr. Sidney Coupland's case, in the *Path. Trans.*, xxxi., is described as a squamous epithelioma. Obstruction of the common bile-duct ensues, if it does not precede; hence distension, jaundice, and cirrhosis of the liver, which latter may be taken for the primary disease.

Cancerous growths developed in the Great Omentum, appear generally to be derived from its lymph-glands, or other adenoid tissue (*lympho-carcinoma*). True *sarcomata* within the abdomen are probably rare; the majority arise either from the periosteum of the bony structures, or from the capsule of the kidneys. A large number of tumours so-called have plainly commenced in vestigial structures, and should be referred to the new class *blastoma*.

Huge masses of malignant round-celled growth are not infrequently found in both the large cavities; and in the advanced stage attained before direct examination becomes possible, cannot be referred with certainty to their point of origin. Within the thorax, these appear most commonly to be derived from the degenerate thymus. They hence often involve marked deterioration of the blood, denoted by rapidly progressive anæmia, petechiæ, and hæmorrhagic effusions.* Microscopically, they present the characters of lympho-carcinoma. Within the abdominal cavity, similar disease in adult life is most often plausibly referable to the lymph-glands, or other lymphoid tissues; in childhood, to embryonic vestiges, particularly to those of the

* Bearing upon these phenomena, see paper by Dr. Acland, "Changes in the Thymus in Hæmophilia and Purpura": *Path. Trans.*, xxvi. Six cases of persistence till adult life are detailed by Dr. A. Bruce, *Ibid.* xviii. See also p. 69.

Wolffian body. The cases are usually reported as "Round-celled Sarcoma."

The phenomena of parotid "blastomata" prove, however, that this sequence is not restricted to the early years of life; that the numerous tumour-formations of that organ, which unmistakably own an embryonic source, commonly remain quiescent for a long period of years, and only develop malignant symptoms after the operation of some special exciting cause, such as mechanical injury. There can be no doubt that an exactly similar dormancy may attend other foetal residua. The development of many internal malignant lesions, even in adults, can only be accounted for on the supposition of such a congenital origin. The subject, however, is involved in very great obscurity, and the true pathology of visceral cancer has yet to be written.

In the Brain and Spinal Cord are developed various rare and obscure forms of tumour. Those found within the nerve-substance were generally referred to the neuroglia (*glioma*); the distinction between such when developed in adults from the retinal cancers of young children has been already pointed out. Some grow slowly, and prove fatal by their bulk and pressure-effects; others emit metastases.

On their investing membranes also grow malignant lesions, sometimes described as *sarcomata*, sometimes referred to the endothelium (*endothelioma*). These show a similar diversity in clinical career. The more acute prove quickly fatal, with multiple metastases in the brain or cord, and sometimes also in the viscera. Little attention would seem to have been hitherto paid to the causation-history. It is probable that many cases both in early and in later life own a vestigial source. The case cited at p. 6 shows the facilities afforded by the sub-dural and sub-arachnoid spaces, with the central canal, for dissemination by auto-inoculation grafts. In two others of widely diffused sarcoma of the spinal membranes, reported by Drs. Sydney Coupland and Pasteur (*Path. Trans.*, xxxviii.), the multiplicity of nodules about the cauda equina may perhaps indicate this mode of propagation.

Causes.—Of internal cancer in adults, one of the exciting causes referred to in Chapters VII. and VIII., Part I., will be

found antecedent. The appearance of malignant developments from foetal relics is necessarily more obscure. Many cancerous internal growths in the aged appear to escape recognition, and to be recorded under various obscure titles (p. 346).

Symptoms and Course.—Whatever its form, the cancer-process in internal organs is almost invariably *acute*. Chronic lesions, in any way resembling “atrophic” scirrhus, are excessively rare. There is, *ab initio*, a rapid and conspicuous deterioration of the physical powers, passing into extreme weakness and emaciation, and proving quickly fatal. The symptoms may, however, be masked by mental derangement, a not infrequent sequence of cancer.

Concurrently is generally found a rapidly increasing *tumour*. Should this be developed within the cranium, its presence will be apparent only through its pressure-effects. Until the cell-growth involves tension of fibrous envelopes, or irritates sensory nerves, the mass progresses *painlessly*, but exhibits marked *tenderness on pressure*.*

The *hyperæmia*, which always characterises cancer, becomes conspicuous in various ways: by dilated surface blood-vessels; by slightly elevated temperature; by serous effusions (ascites, hydrothorax); by hæmorrhage from free surfaces (hæmoptysis or “currant-jelly” expectoration, hæmatemesis, melæna, hæmaturia, &c.).

Various *pressure-effects* occur, to be recognised as of cancerous origin, from their severity, from their rapidly and steadily progressive character, ensue: in the brain, mental derangement and interference with the function of special nerves; in the cord, paraplegia; in the liver, jaundice of a deep yellow or dusky olive-green hue;† in the respiratory organs, extreme dyspnœa, lividity, sometimes dysphagia, &c.

Treatment.—Cancer within the large viscera admits necessarily of surgical treatment only in palliation, as by the removal

* Cases diagnosed as of “Progressive Anæmia” have been found really due to unsuspected internal cancer, particularly of the stomach.

† The tint is not invariably indicative of malignancy. I have seen a young man with a large mass of hydatids in the liver, whose skin was of a deep greenish-yellow (*Brit. Med. Journ.*, May 9, 1891). He recovered perfectly after incision and drainage.

of serous effusions. When paracentesis, abdominal or thoracic, becomes indicated, it is advisable not to delay the measure until the functions of the important organs involved become materially impaired, and this should be resorted to repeatedly. After tapping the abdominal cavity, it is essential afterwards to suture accurately the minute wound inflicted; should any oozing take place, death speedily ensues from septic peritonitis. It is best not to withdraw the whole fluid contents; complete evacuation exposes the parts, always abnormally tender, to painful pressure or friction.

Opium, in quickly increased doses, should be administered, *ab initio*, by the opium-pipe when the patient is presumably of sufficient intelligence; and the efficient use of that valuable implement, cuca-wine, pre-digested foods, careful nursing, mental and physical passivity, are among the hygienic measures indicated to check the progress of the disease and prolong life.

The signs of internal cancerous disease may be masked by mental derangement, and may also escape notice in advanced age. The phrase "inflammation of the bowels," in common popular employment, probably covers some of these cases; its equivalent in the death-certificate would be "gastritis" or "enteritis." Another vague term similarly used is "senile decay."

APPENDIX A.

THE GROUP OF CANCERS, AND OF TUMOUR-FORMATIONS ON THE BORDERLAND OF CANCER, WHICH ARISE FROM FŒTAL RESIDUA.

Blastomata.

THE malignant lesions comprised in this small and obscure division arise for the most part in infancy or early childhood, sometimes even before birth. Their microscopical characteristics vary greatly with that of the parent-structure whence they are derived; the majority have hitherto been classed with the sarcomata. As previously remarked, it is only in this connection that a congenital causation-element can be recognised in cancer, and that to the tumours now referred to the inclusion-theory of Cohnheim *solely* applies.

The most familiar examples of tumour-formations derived from fœtal relics is afforded by the numerous mixed new-growths found at various periods of life in the PAROTID GLAND, or in its immediate vicinity. These are derived from included groups of embryonic cells, pertaining to one or other of the branchial arches. The most common of many miscellaneous constituents is *cartilage*, referable to unobliterated traces of the structure bearing the name of Meckel. In addition, the tumours may appear as ordinary dermoids, cystic or solid; as simple cysts, or "cystic sarcomata"; as "sarcomata," "chondrifying sarcomata," "myxo-chondro-sarcomata"; as pure or mixed myxomata; even as carcinomata; as "adenomata," "myxo-sarcomata," &c. In addition to the almost invariable cartilage or "myxoma-tissue," bone, striped muscle, glandular, and embryonic connective-tissues, not seldom occur. The cell-constituents may be either "embryonic, myxomatous, sarcomatous, or epithelial."

Parotid neoplasms of congenital origin may not make their appear-

ance in palpable form until fairly advanced adult life; in this respect conspicuously differing from those acutely cancerous derivatives of the Wolffian body, which will subsequently be alluded to. The minute group of embryonic cells which is their progenitor, may remain permanently encysted or encapsuled, may be wholly obliterated by mucoid degeneration, and hence may constitute tumours wholly devoid of any malignant feature. In a considerable number of instances, however, certain of the epiblastic, sometimes mesoblastic, cells persist; and, after injury, or even from the natural advances of age, proliferate in the cancerous manner, infiltrate adjoining tissues, and, if unmolested, develop the usual phenomena, clinical and microscopic, of the malignant process.

The *soft palate* is not rarely the seat of persistent fœtal relics, and of resulting tumour-developments. These latter often betray the same very mixed composition, described in the parotid lesions, and contain identical tissue-constituents. Vascular erectile growths, dermoids, even dentigerous cysts occur. Encapsuled masses of epithelial cells, enclosing *globes epidermiques*, have been described as "encysted epithelioma of the soft palate." With the cells of epithelial aspect are often conjoined others smaller, lymphoid in appearance, and much embryonic connective-tissue. Many have been recorded under the vague designation "Adenoma."

Palatine embryonic tumours fall under the same rule as those of the parotid; some are benign, some malignant. While the fœtal cells are encapsuled, or if they have wholly degenerated, the new-growth ranks in the former class when the protective envelope has ruptured or become eroded in the latter. When the disease does not fall under professional notice, until it has attained an advanced stage of development, the origin from an embryonic source may be lost sight of. Hence many of the "sarcomata," in particular of the "round-celled sarcomata," reported as here occurring. The more cellular developments involve highly ACUTE and exuberant forms of cancer; those with tendency to organisation lead to more CHRONIC and slowly growing tumours.*

A common source of embryonic new-growths is found in the organs derived from the *Wolffian bodies*, *Müllerian ducts*, and *germinal epithelium*; such are the kidneys, uterine appendages, testes, vesiculae

* For an able account of "Tumours of the Soft Palate," with table of one hundred cases, see paper by Mr. Stephen Paget in *St. Bartholomew's Hospital Reports*, 1886. For congenital Parotid lesions, &c., see "Enchondromata of the Salivary Glands," by Mr. W. H. Jacobson, *Guy's Hospital Reports*, xxvi.

seminales, epididymis, prostate, vas deferens, and cortical part of the supra-renal bodies. The tubules of the first-named structure never wholly disappear; the parovarian organ of Giralde's, and vasa aberrantia of Haller, bear permanent witness to its former existence. But the atrophic involution proceeds much further in the female sex than in the male; and hence doubtless the conspicuous predominance of *males* among those children who suffer from malignant lesions of those parts (pp. 323, 360). The *gubernaculum testis* of the male, and the round ligament of the ovary in the female, containing involuntary muscle, are also atrophied bands proceeding from the Wolffian body. The hydatids of Morgagni are considered to represent the upper part of the Müllerian ducts.

The structures specially characteristic of the Wolffian body, *Malpighian glomeruli and tubules lined by columnar epithelium*, are but occasionally detected in the malignant growth, the primary traces of their existence being rapidly obscured by the heterogeneous cell-infiltration attending the latter stages of all rapidly growing forms of cancer.

Next probably in order of frequency are the huge mediastinal masses which spring from the partially involuted THYMUS, and which present the features of lympho-carcinoma.

Another rare form of embryonic cancer is seen in the RETINAL GLIOMA of childhood, which may commence during foetal life, and not seldom simultaneously attacks both eyes. Although the development of the retina from the two layers of the optic cup is not yet fully understood, yet sufficient is known of the formation of the eye from invaginated epiblast and ingrowing mesoblast, to indicate how readily aberrant inclusion of embryonic cells may occur in this region.

The bladder is formed by a spindle-shaped dilatation of the stalk of the ALLANTOIS. The lower part of the spindle constitutes the entire female urethra, the first part of the male; the upper is the urachus, often long retaining its patency. Here also are sufficient facilities for the inclusion and persistence of foetal structures, which should normally have become obliterated.

The COCCYGEAL BODY is a fruitful source of tumour-formation. The tumours, according to Mr. Bland Sutton's *Evolution in Disease*, are sometimes a congeries of cysts, lined by epithelium; sometimes they practically constitute a portion of INTESTINE coated internally by mucous membrane, and possessing Lieberkühn's follicles. Other diverticula of the primitive neural or alimentary tube give rise to new growths with similar characters, either cystic on the one hand, or, on the other, consisting of branching tubules, lined by cylindrical

epithelium and filled with mucoid secretion. Those of the second type, from their resemblance to the most common form of cancer in the lower part of the digestive tract, have often been reported as "columnar epitheliomata." In the hinder part of the Tongue, the *thyreo-lingual duct* is a frequent source of new-growths analogous to the preceding. Most resemble in structure the thyroid body, others are cystic or of mixed composition. Removed by the surgeon in the localised or encapsuled stage, these pass as "benign"; left until that of promiscuous cell-infiltration, their congenital origin remains unrecognised.

Certain fetal structures which persist in palpable form occasionally prove the site of tumour-formation. The Pituitary Body (*hypophysis cerebri*), at the cranial extremity of the notochord, is developed from a diverticulum of the buccal epiblast, against the posterior wall of which grows down the *infundibulum* from the floor of the second cerebral vesicle. The Pineal Gland or *epiphysis cerebri* appears in reptiles as a rudimentary eye. The tumours are rare, or are rarely recognised; they grow freely in non-resisting brain-tissue, and destroy life by local pressure-effects. They are generally classed with the endotheliomata; and some solitary "cysts" own probably a like origin. As metastases are exceptional, many are regarded as benign. When calcified ("*psammomata*") they rarely fail to remain permanently quiescent and harmless.

The vestigial tumour-formations known as dermoids, present two types of structure: cysts and solid tumours. Dermoid cysts arise from "sequestered portions of the surface-epiblast, chiefly in situations where, during embryonic life, coalescence takes place between two surfaces possessing an epiblastic covering" (Bland Sutton). Such are the mid-line of back, abdomen, thorax, neck (lines of primary coalescence); the scrotum, orbital and branchial fissures (lines of secondary ditto). The simplest forms occur at the angle of the orbit and in the upper eyelid; they are lined by skin, with a very thin epidermis. Hairs sprout therefrom; there are sebaceous glands, often very large; the cyst-contents are shed hairs, sebum, cholesteroline. More complex forms specially affect the ovary, and in addition to the cutaneous structures or secretions mentioned, contain bone, teeth, sweat-glands, even a rudimentary mamma, penis, or eye.

The solid dermoid tumours are pedunculated, often pear-shaped; are externally covered by skin, which is often furnished with tufts of long hair. Teeth may occur. Internally they consist of connective-tissue, not infrequently containing cartilage. They are most

common in the pharynx, hanging from the roof or soft palate; and in the rectum.

There does not appear to be any valid line of differentiation between these two forms, cysts and solid tumours; and growths of mixed composition abound. As arising from the six obsolete foetal canals of the mamma, viz., the infundibulum, neurenteric passage, post-anal gut, cranio-pharyngeal canal, thyreo-lingual duct, and vitello-intestinal duct (d. of yolk-sac); Mr. Bland Sutton describes three types of new-growths: dermoid cysts, dermoid solid tumours, and "thyroid-dermoids," or "congenital adenomata."

The "thyroid-dermoids" have been frequently reported as CARCINOMATA, CYSTIC SARCOMATA, adenomata, &c. They structurally resemble the thyroid body, and are often associated with striped or unstriped muscle-fibre. The most typical occur near the coccyx, in the hind part of the tongue, and in the neck.

These obsolete foetal passages are all diverticula from the primitive alimentary canal, and practically are sequestered portions of bowel; just as sequestration-dermoids, are for tumour-formation purposes, isolated fragments of skin. Hence they may, when generating a tumour, reproduce characteristic intestinal structures. The sacro-coccygeal tumour, which is a derivative from the coccygeal body, is structurally a type of the group. It consists of crypts and glandular recesses lined with cubical epithelium. These contain ropy mucus, and sometimes a substance resembling hyaline cartilage, and are held together by richly cellular connective-tissue. They may contain Lieberkühn's crypts, solitary follicles, and unstriped muscle.

The common origin, from a primitive U-shaped tube, of the alimentary canal and central nervous system of vertebrates, has been demonstrated by Mr. Bland Sutton. Hence the occasional occurrence about the spinal cord, medulla, and pons of tumours with the structural characteristics of intestinal cancer (cylindroma), and described sometimes as of endothelial origin, sometimes as "columnar epithelioma." Of such a tumour, developed immediately above the pons and peduncles in a woman aged thirty-two (*Path. Trans.*, xxxix. 5), Dr. Joseph Coats has very courteously permitted me to inspect the microscopic section. It reproduced in every feature the characters of an ordinary intestinal cylindroma.

The "mixed embryonic tumours" of Cornil and Ranvier are huge masses found within the bodies of foetuses or of new-born infants; in the latter case they prove fatal within a few days after birth. By Virchow they have been described as teratomata; they differ from the true teratoma, however, in having no fixed form bearing the least

resemblance to that of a human being. They consist of "an embryonic tissue which has undergone such an evolution that most of the tissues are represented." In form, colour, and consistency they resemble encephaloid cancer. They might be regarded as sarcoma developed in the embryo; but differ in the multiplicity of normal tissues met with in them, particularly in the conjunction of epithelial, muscular, and cartilaginous masses "from all sarcomata hitherto described." The organised structures, however, "have a *much less advanced degree of development* than in the subject bearing the tumour. In the midst of the embryonic tissue, which is permeated by blood-vessels with embryonic walls, are found, first, striated muscle-fibres in the process of development; secondly, embryonic cartilage; thirdly, bone in the act of development from cartilage, the osseous and cartilaginous masses being respectively covered with periosteum and perichondrium; fourthly, *cysts* with a well-developed membrane and internal epithelial lining formed of tessellated or cylindrical ciliated cells; fifthly, long *tracts or tubes of cylindrical epithelium, or lobules of pavement epithelium*. They cannot be looked upon as a fetal inclusion; for nothing resembling the form of a fœtus is to be found." (Cornil and Ranvier, *Pathol. Histology*, transl. by A. M. Hart, 2nd edition, i. 302.) Such lesions would probably now be classed with *Rhabdomyoma*.

In the above account of these rare tumours, I have italicised certain words, which seem to me to assimilate them to many lesions of fairly common occurrence; or which, on the other hand, bear upon that tendency to devolution conceived in this work to be the key-note of cancer-developments in general.

Dermoid new-growths, whether cysts or solid tumours, are commonly placed in the benign group; and the simpler epiblastic forms on the surface of the body seldom develop malignancy. It is, however, quite possible that the occasional origin of cancerous tumours in such a manner has hitherto passed unrecognised because not looked for, and that with acknowledgment of the principle involved, instances in exemplification may arise. With the thyreo-dermoids the case is different. Some are removed in the pre-malignant stage, as encapsuled cysts or quasi-cysts; but many, on the other hand, prove fatal with secondary metastases. The titles under which, above referred to, the cases have been published, testify to their essentially cancerous nature.

It is in connection with the ovary and other uterine appendages that *the inherent tendency of these congenital tumours to develop a cancer-process is most conspicuously apparent*. An ovarian dermoid

is often an actual, always a potential, cancer, only not more commonly recognised as such, because of its encapsulation. That barrier broken down, the usual phenomena of malignancy—progressive erosion by rapidly proliferating cells, secondary metastatic deposits, even auto-inoculative grafts—necessarily ensue.

Mr. Bland Sutton, to whose valuable researches in what may be styled “neoplastic embryology,” I must express profound obligations, and who in the ovarian region has seemingly arrived at the same conclusion as that here formulated for the entire field, cites at p. 70 of *Surgical Diseases of the Ovaries and Fallopian Tubes*, the case of a woman, aged twenty-eight, with a huge dermoid cyst, noticed ten years. It contained hair and teeth. To the main cyst smaller were attached by pedicles; others were lying perfectly loose. The largest of the latter was of the size of a hen's egg; it lay among adhesions of the small intestines, which completely parted it from the parent cyst. There was another (fixed) in the great omentum; two near the right broad ligament; many small ones adhered to the mesentery or pelvic peritoneum. Here we have both metastatic deposits, and seemingly also “auto-inoculation” grafts.

Kolaczek, in Virchow's *Archiv*, Bd. lxxv. s. 399, narrates the case of a woman, aged forty, with an ordinary ovarian dermoid. Numerous “small fellow knots” were dotted over the peritoneum, and many of the knots contained fine hairs. In Mr. Jessop's case, quoted by Sutton, one large cyst, with several smaller, was found and removed. At the autopsy cancerous deposits were discovered in the liver, right supra-renal capsule, and mesenteric glands.

Such cases are prone to “recur” after removal. In the *Med. Times and Gazette*, 1883, vol. ii. p. 235, Mr. Knowsley Thornton narrates an instance in which he removed an ovarian dermoid in June 1881; the patient died with a “recurrence” in May 1882. Mr. Alban Doran (*Tumours of the Ovaries*, p. 89) speaks, on the authority of the same surgeon, of several similar, in which, two or three years after the excision of large dermoid cysts, malignant tumours composed of soft white material, and strongly resembling sarcomata in the pelvis, were found. (See also note at p. 115.)

An interesting feature in the morbid histology of these dermoid cancers is the difference in microscopic phenomena, which they present at different ages. “In fetuses and very young children the cell-elements predominate; towards puberty, the new tissue tends to assume an alveolar arrangement, and to mimic the structure of cancer.” This supports the theoretical view of malignancy as cell-reversion to a primitive condition, advanced at the outset of this work.

A large proportion, even as now recorded, of ovarian tumours found in infancy, are dermoids. Of 60 cases in infants or children under the age of puberty tabulated by Mr. Bland Sutton (*Diseases of the Ovaries*, p. 90), 28 are so styled, 16 being reported by various authors as "sarcomata," and 16 as "cysts." More extended knowledge will probably refer the whole to included embryonic remains.

The mystery attending the development of new-growths in the ovaries or Fallopian tubes of young female children is indicated by the varying nomenclature of those surgeons who have described them. Hence Mr. Sutton proposes the adoption of the term "Oophoroma" for these obscure congenital lesions; and goes on to state that such are rare before puberty. Usually both organs are simultaneously attacked, but, in a fair proportion, only one. The tumours "histologically repeat the characters of the connective-tissue of the foetal ovary." They recur locally after removal and lead to secondary deposits. Their microscopic appearances vary, as above stated, with the age of the individual.

It seems possible, on the analogy of the parotid, that some of the rarer pathological developments found in later life in the female sexual organs — such, for example, as myo-sarcoma — may eventually prove of similar origin. But nothing is now certain on this point.

The employment of a comprehensive general designation for all forms of malignant or quasi-malignant new-growth proved to own a congenital source in some unobliterated group of foetal cells, or partially persistent vestigial organ, would obviate the obscurities of classification above referred to. While expressing plainly the origin of the disease, such a word would aptly indicate many neoplasms of complex and bewildering structure for which no suitable comprehensive title exists; and which therefore now serve only as curious pathological puzzles. It would bracket together tumour-formations in divers parts, of very various structural details, of unequal degrees of malignity; even with cancerous features manifest only in exceptional instances. Yet all own a vestigial source, and the majority exhibit a certain uniformity in clinical behaviour. Hence a generic designation would seem greatly needed. For all the neoplasms above described, and for others in which an embryonic source will probably hereafter be recognised, I would venture to suggest the establishment of a distinct nosological class, that of the "Blastomata" (βλαστος, a germ).

Of tumour-formations to be aptly placed in this division, I conceive the following to be attributes or distinguishing badges:

- (a) Some spring from organs which are obviously persistent foetal rudiments: *e.g.*, the thymus gland, the pineal and pituitary bodies, the parovarium, &c.
- (b) Others from vestigial structures, which are normally obliterated to a much further extent than the preceding, yet of which traces may always be found when sought. Such are the Wolffian body and Müllerian ducts.
- (c) Thirdly, new-growths developed from embryonic cells which persist but exceptionally, and then often merely in microscopic shape: *e.g.*, ovarian and other "dermoids"; the "coccygeal" tumours, with other derivations from obsolete canals; the "cylindromata," which are occasionally found at the umbilicus as the result of a patent urachus, also in brain or spinal cord.
- (d) Tumours which appear about the branchial arches, the orbit, or the various other lines of coalescence, where "dermoids" naturally occur; and which betray their embryonic origin by the possession of normal tissues, such as cartilage, in an abnormal situation: *e.g.*, various "mixed" growths in the parotid, testis, occasionally even in the mamma, rectum, &c.
- (e) Malignant lesions, occurring in early child-life, which occasionally prove BILATERAL: *e.g.*, retinal gliomata, oophoromata, rhabdo-myomata. No form of synchronous bilateral cancer occurs in the adult.
- (f) Certain obscure and otherwise unaccountable tumour-formations in the adult present claims to be PROVISIONALLY included in the same category. Such are new-growths in various parts of the central nerve-system, passing as endotheliomata, columnar epitheliomata, psammomata, gliomata, the plexiform sarcoma of Billroth, and other forms of orbital tumour; some "cysts" and angiomata; melanotic cancer developed in regions free from pigment-cells; many mixed and complex "sarcomata," &c.
- (g) Most, if not all, malignant tumours in young children must be ascribed to foetal relics. The organs attacked are often specially exempt, in the adult, from cancer: *e.g.*, the adrenals. Some vestigial tumours develop highly acute and rapidly growing forms of cancerous disease: *e.g.*, rhabdo-myoma. Others remain encysted or encapsuled, and are discovered but accidentally after death from other cause, as in the case of many brain-tumours. Others, again, pass long years of quiescence, and then rapidly increase, either with seeming

spontaneity or after the receipt of mechanical injury. Some display cancerous phenomena but seldom; others never fail to pass into an obviously malignant lesion.

- (h) The pathological characters of the tumours constituting the new group, vary as widely as the features of their clinical career. Some are almost wholly composed of actively proliferating cells, round or ovoid, with very scanty organised tissue, and without surviving traces of any primitive foetal structure. These highly cancerous lesions pass commonly as "sarcomata," usually of the "round-celled" class; and can only be identified as of congenital origin by their situation, history of precedent abnormality at the spot whence they have arisen; most of all by their development in infancy, or early youth. Such are many of the kidney-sarcomata in Dr. Windle's tables (p. 360), the mediastinal *lympho-carcinomata*, derived from the thymus, various tonsillar or pharyngeal growths, &c.

Others again contain very numerous structures, some of the highest elaboration, as striped muscle, and nerve-ganglia or fibres; while a third section is constituted of tissues normal to the part, mingled with a few scattered nodules of some substance extremely heterogeneous. The "mixed embryonic tumour" of Cornil and Ranvier exemplifies the former condition; mammary new-growths, containing cartilage or bone, the latter. A relatively numerous division is mainly formed of cysts, lined by columnar epithelium, of tubules resembling Lieberkühn's follicles; or of acini, with mucoid contents, paralleling the structure of the thyroid body. A few are little else than masses of fat, in strange sites.

The most significant characteristic of a "Blastoma" is a mixture of unrelated and dissimilar tissues; of carcinomatous or epithelioid cells, with the embryonic spindle-shaped elements of sarcoma; of tubules or cysts lined by cubical or cylindrical epithelium, with areas of heterogeneous cell-infiltration; of glandular crypts or acini with structures of the connective-tissue group, cartilage, fat, bone.*

* It may be pointed out, that should those regions of a malignant embryonic tumour, in which cell-proliferation is actively taking place, be alone examined microscopically, the tumour will differ in no respect from an ordinary carcinoma, or "round-celled sarcoma."

Cases of Malignant or Quasi-Malignant Blastoma. The words italicised indicate Cancer-affinities; or features commonly associated with Cancers of the ordinary type in the adult.

Case 31, in Mr. S. Paget's table of "Adenomata" in the soft palate (*op. cit.*), is inserted therein as "half-way between innocent tumours and the sarcomata." The growth consisted of fibrous tissue over a cartilaginous matrix; it contained masses of round cells, "evidently of a recent growth, and of a more or less sarcomatous nature."

In the *Path. Trans.*, xxxviii., are two cases by the same surgeon of embryonic tumours in the palate. One in a girl, of twenty-one, had been noticed four years. It presented "a homogeneous or hyaline matrix, containing sinuous masses of cells, some epithelial, some of glandular type laid down in tubules. The general aspect under the microscope was altogether irregular or embryonic. A second, in a woman of forty-five, had been observed fourteen years. It had the same diversity of cells, the same unfinished gland-tissue, the same well-marked cell-nests." With these may be compared the pathological details in a case of true sarcoma with mixed round and spindle-cells, in a man of sixty, reported in the same paper. The latter had been growing a year and a half.

The same volume of the *Path. Trans.* contains a case of "Adeno-sarcoma of the Tongue," by Mr. R. J. Godlee. It occurred in a woman of twenty-four. A large proportion of the growth consisted of *sarcoma-tissue*. There was also a glandular element disposed in irregular acini, and a bony-looking body, regarded as a salivary calculus.

In the *Path. Trans.*, xxxviii. 1887, is a valuable case reported by Mr. F. S. Eve, which exemplifies cancer-association with congenital lesions ordinarily benign. It is entitled "Multiple Angiomata of the Leg, with Multiple Enchondromata, and a Sarcoma." The leg and foot were deformed by multiple cavernous angiomata; the long bones are bent. Two osseous tumours grew from the upper end of the tibia, and one from its lower; there were similar masses, regarded as probably calcified enchondromata on the second, third, and fourth toes, where they had destroyed the bones. At the outer and posterior surfaces of the ankle was a *sarcoma*. In the cancellous tissue of the lower end of the femur were small brownish, granular masses, apparently naevoid, and similar to the surface angiomata; within its shaft were bands and islands of cartilage (410A. *Path. Cat.* R.C.S. Museum).

A congenital "Fibro-sarcoma of the Back," is reported by Mr. Davies-Colley, in the *Path. Trans.*, xxxv. It occupied a line of primary coalescence, and serves to illustrate cancer-transition from an ordinary epiblastic dermoid. The patient was a lad of sixteen; the tumour had been no bigger at birth than a pin's-head, had gradually increased since, at first slowly, later with some rapidity. Three weeks before admission into hospital it had ulcerated, and now extended from the fourth to the tenth dorsal spine. Being excised, it was found to consist of loculi, closely aggregated, containing yellowish ovoid bodies, which were easily shelled out. The fundamental tissue was whitish, resembling that of the mamma. Under the microscope, the ovoid bodies were found to consist of a delicate indistinctly fibrillated stroma, in which were numerous fusiform cells with elongated nuclei, closely resembling muscular fibres.

Plate xxv. in the same volume represents a "Congenital Papilloma" in the line of a branchial fissure, reported by Mr. H. H. Clutton. The patient was a man of twenty-six.

In the *Path. Trans.*, xxxv., is recorded a "Congenital Tumour of the Orbit," by Mr. George Lawson. It occurred in a child of two, and is ascribed to foetal remains at the cranial end of the notochord, growing upwards from the body of the sphenoid bone, and pushed the eye forwards. There were numerous cysts; together with a solid basis, of mixed embryonic structures.

Vol. xxxvi. of the *Path. Trans.* contains a case of "Myo-neuroma of the Pituitary Body," reported by Dr. Hale White. The tumour was as large as a filbert, the greater part being composed of striped muscle-fibre. There were also bundles of white nerve-fibres, a body like a sympathetic ganglion, many ganglion-cells, multipolar and nucleated. The presence of muscle is explained by the assumed persistence of portions of the mesoblast pushed inwards by the epiblastic part of the pituitary body.

Another tumour of the same organ, reported by Mr. A. Bowlby in the same volume, occurred in a male of twenty-two. There were numerous cysts, whose cavities contained broken-down epithelium, and calcareous débris. The solid base consisted in part of hard nodular bone; partly of soft brain-like tissue, amid which were the cysts. The softer portion under the microscope was seen to be a connective-tissue stroma, containing a *very large number of blood-vessels*.

In various regions were ingrowths of *epithelial cells*; the columns showed a great tendency to cystic degeneration, thus forming the cysts described. The author refers this growth to the epiblastic and hypoblastic elements which unite in the situation of the pituitary gland. In the same volume, Dr. Goodhart reports a case of "Cancer of the Pituitary Body" in an Anubis baboon.

A tumour in the pituitary body of a man, aged twenty-three, consisted of cells with clear contents, and a single nucleus, with smaller cells, the size of lymph-corpuscles. It was regarded as an endothelioma (Dr. F. Taylor, *Path. Trans.*, xxxv.)

In the Pineal Body, Dr. Charlewood Turner records, in the *Path. Trans.*, xxxvi., an instance of "Spindle-celled Sarcoma, containing Glandular and Carcinomatous Structures."

The plate shows columns of carcinomatous cells, also large spindle-cells.

Wiegert, in Virchow's *Archiv*, Bd. lxx. s. 212, describes a tumour of the pineal body, consisting of numerous cysts—lined partly with cylindrical epithelial cells, partly with flattened ditto. Between the cysts were hair-follicles and sebaceous glands. The fundamental stroma contained hyaline cartilage, fat, muscle, and nerve-tissues. Several varieties of new-growth found in this organ are also described in Birch-Hirschfeldt's *Lehrbuch der Pathologischen Anatomie*.

Dr. Ogle records (*Path. Trans.*, xvi.) a mass of carcinomatous deposit weighing 2 lbs. 2 ozs. in the left Supra-renal Capsule. A vestigial source is indicated by the early age, three years. A case, entitled "Primary Sarcoma" of the supra-renal capsule, is narrated by Dr. Colcott Fox, in *Ibid.* xxxvi.; it began at the age of a year and a half. Dr. Greenhow (*Ibid.* xviii.) reports another in a child of twelve.

Cases of ovarian "Oophoroma" are cited at pp. 115, 353. The rare dis-

eases of Kaposi and Dühring (pp. 196, 197) further illustrate eventual cancer-development from apparently congenital lesions.

A "Myo-lipoma" of the spinal cord, containing striated muscle, is reported by Dr. Gowers in the *Path. Trans.*, xxvii. It was situated close to the cauda equina; no history is attached.

For drawings illustrating the microscopical features of the congenital sacral tumours, see *Path. Trans.*, xxxii. (Mr. Shattock).

Cases variously entitled "Columnar" or "Tubular" Epithelioma of the upper jaw, present obscure indications of embryonic origin. One recorded in the *Path. Trans.*, xxxii., by Mr. Rushton Parker, occurred in a youth of nineteen; the structure is stated to have borne an almost exact resemblance to rectal cancer. Two in vol. xxxvi., by Messrs. Bilton Pollard and Baker, were respectively found in a man of sixty, and a woman aged thirty-seven. Epithelioid cells, some in columns, some lining tubular spaces; a stroma, hyaline or finely fibrillated, are the microscopic characteristics. The same features are described in a "Round-celled Sarcoma of the Popliteal Space," from a man of nineteen, reported by Mr. Butlin in the *Path. Trans.*, xxxii., and regarded by its author as an instance of the "Cylindroma of Billroth."

With some hesitancy, also, abnormal deposits of bone in or about the eyeball may be referred to foetal residua. According to Mr. Ernest Hart, bone formation within the eye occurs only in the choroid coat (*Path. Trans.*, xiii.). The huge "ivory exostoses" of the orbit, steadily progressive until death (*Ibid.*, xxii., Mr. Spencer Watson), may arise in childhood or early youth; they differ, however, from cancer in their slow growth, and in the non-emission of metastases.

Eight cases of primary malignant growth of the *anterior mediastinum* are reported and carefully analysed by M. Letulle in the *Arch. Gén. de Médecine*, December 1890. He refers them to the Thymus, particularly remarking on their polymorphism as evidence of this. The thymus originates as a diverticulum from the front part of the third branchial cleft; in a foetus, 18 millimètres long, the upper part is already grouped in lymphoid masses with round cells; the lower portion, corresponding to the upper part of the mediastinum, consists of layers of secreting cells, epithelial in character. Thus this vestigial organ, of which there are often sufficiently conspicuous traces so late as the fiftieth year, may be the source of malignant tumours presenting under the microscope the features of carcinoma, or of lympho-carcinoma, or of these varieties mixed in different regions.

Of M. Letulle's cases, three are reported as "sarcoma," one of which presented certain peculiarities of structure, and is so denominated a "trabecular lympho-sarcoma"; one was a mixed growth—viz., a "round-celled sarcoma," with parts here and there bearing the structure of carcinoma; two were "lymphadenomata"; two were carcinoma. All began in the anterior mediastinum; spread downwards, and in front of the pericardium, pushing away the lungs

and heart eccentrically; and infecting the pleuræ from above downwards. One patient, a woman, was twenty-three years of age; all the rest were over forty. In one case there was bulging with pulsation to the right of the sternum; in four, there was pleural effusion. Four of the patients died suddenly. All the cases were very acute.

Dr. Bertram Windle's researches (*Journal of Anatomy and Physiology*, vol. xviii, p. 166) are of great value in proving the congenital source of many cancerous Kidney-lesions; in addition to that of the Rhabdo-myomata, already recognised as thus derived. His 11 cases of "sarcomata" with striated muscle-fibre, include the 7 referred to at p. 149. Of these, the right kidney was the site in 2, the left in 4, BOTH in 4; with 1 not stated. The youngest case occurred at 7 months, the oldest at $3\frac{1}{2}$ years. The sex is given at p. 323.

The remaining cases showed a mixed composition; hence are recorded as "mainly spindle-celled," "mainly round-celled," and miscellaneous (angio- or myxo-sarcoma). Of 8 in the first class, the right and left kidneys were each attacked in 4. One case occurred at 7 months, 1 at 10 months, 1 at $2\frac{1}{2}$ years, 1 at $3\frac{1}{2}$, 1 at $5\frac{1}{2}$ years. Three adults suffered at the ages of 34, 55, and 76 respectively.

Of 12 "mainly round-celled" sarcomata, 5 attacked BOTH organs, 4 the right, 2 the left, with 1 uncertain. The ages were 6 months, $1\frac{1}{2}$ year, 2, $2\frac{1}{2}$, $3\frac{1}{2}$, 4, and 6 years; with 3 adults at 21, 35, and 50 respectively.

Of 3 in the miscellaneous group, BOTH kidneys were diseased in 1, the left in 2 instances; the ages were $1\frac{1}{2}$, 5, and 25 years respectively. Of 7 not microscopically examined, 1 occurred in a premature infant, 1 at 10 months, 2 at $3\frac{1}{2}$ years, 3 at 7, 5, and 8 years.

Of the Rhabdo-myoma cases, 4 were metastatic; in case 3, nodules of "striped muscular sarcoma-tissue" occurred under peritoneal coat of the diaphragm; in case 4, the liver contained a nodule of ordinary sarcoma-tissue; ditto in case 11; in case 10, greyish-white masses, containing striated muscle, were found in the right auriculo-ventricular orifice, and in the pulmonary artery. The muscle-fibre is noted as being, in every case, without a sarcolemma.

APPENDIX B.

Multiple Cysts in Divers Organs.

A GENERAL tendency to the formation of minute cysts throughout the mammary parenchyma has been referred to in the text as one of the most common aberrations during the senile involution of the female breast; not in itself cancerous, but extremely prone to become eventually associated with either carcinoma or sarcoma. A similar "cystic degeneration" also occurs, though with extreme rarity, in organs not normally passing through an involution-stage, such as the liver. A case of "spongy liver" in a maniac female, aged forty-two, is recorded by Drs. Savage and Hale White, in the *Path. Trans.*, xxv. The whole was converted into a spongy congeries of cysts, regarded by the authors as produced by the vacuolation of hepatic cells, not by dilated ducts.

A cognate condition in the brain of the insane is known as "Gruyère cheese-brain," and is believed to be due to the dilatation of lymph-spaces. Solitary cysts in the cerebellum, in the pancreas, in the adrenals, and various other abnormal localities, are not unusual. Dr. Pye-Smith assigns to these latter one of three causes: *dilatation of natural canals, vacuolation of gland-cells, expansion of lymph-spaces*. A fourth may plausibly be added: the *mucoid degeneration of residual embryonic cells*, as noted in Appendix A. None of these pathological states is known to bear any affinity to cancer. By the early age of some of the subjects, an embryonic source seems, however, indicated. Thus of three cases of "simple cyst of the cerebellum," by Messrs. Colman, Hadden, and Gulliver, in the *Path. Trans.*, xli., one patient was a male of seventeen, another a female of fourteen, the third (a man) had reached the age of thirty-six.

When, however, very numerous cysts are found, not only in a single organ, but variously scattered throughout the body, the case

strongly suggests affinity to the metastatic phenomena of malignant disease. The resemblance is still more striking when a single large cyst occurs, with multiple smaller. Thus in the *Path. Trans.*, xxxvi. p. 17, Dr. Pye-Smith records the case of a policeman, aged thirty-seven, who had often been subjected to rough usage. A cyst, the size of a billiard-ball, was found in the *cerebellum*, containing clear fluid; in the *kidneys* were from twelve to eighteen very small cysts; in the *pancreas*, eight or nine others varying from the dimensions of a hemp-seed to that of a bean. In the same paper reference is made to two others by Dr. Bristowe (*Ibid.* vii. and x.), one by Dr. Wilks (vii.), two by Rindfleisch (*Lehrbuch d. path. Gewerbelehre*, Murchison's translation); another by the latter author (xxxii.). The liver and kidneys are the organs mentioned as being most often thus associated. Dr. Charlewood Turner describes (*Path. Trans.*, xxxix.) the case of a man, aged forty-four, who had received a blow with a brick eight years before death. There was a cyst as large as a pigeon's egg on the under surface of the right *cerebellar lobe*, a smaller on the upper. In the *right adrenal* was a tumour the size of a fist, in part fibrous, with opaque necrotic areas, containing numerous cysts. There was no bronzing; several cysts were found in the *left kidney*, one in the *liver*.

Drs. Savage and Hale White (*Ibid.*, xxxiv.), "On the Causes of Holes in the Brain," quote the instance of two general paralytics, in whom was found universal cystic degeneration of *brain, liver, kidneys, lungs*, and muscular fibres of *heart*.

While as yet not completely proven, there is reason to account for the condition in some at least of these mysterious cases, by the supposition of a cancer-metastasis, in which all the cells remaining encapsuled have undergone mucoid degeneration. That view is supported by the phenomena of many "blastomata," also by the state of undoubted secondary cancer-metastases in exceptional instances, wherein malignant epithelial or carcinomatous parenchyma has been wholly transformed into fluid. See examples of "Malignant Cysts in the Neck," *Path. Trans.*, xxxviii., produced by liquefaction of the contents of an epitheliomatous lymph-gland.

A case which remarkably illustrates the association of cancer with cyst-dissemination was described by the late Dr. Mahomed, in the *Path. Trans.*, xxxiv. p. 182. The *undescended testis* of a man, aged fifty-three, was the seat of medullary carcinoma; the *thymus* was occupied by solid secondary deposit: numerous cysts occurred in the *kidneys*, and the *liver* resembled a Gruyère cheese.

APPENDIX C.

REPRINT OF PUBLISHED CASES BEARING UPON THE PATHOLOGY, &c., OF:

(a) *Insidious Marrow-Infection.*

THE following is a brief report of specimens exhibited at the Bournemouth Meeting of the British Medical Association in 1891, and is taken from the *British Medical Journal* of March 12, 1892. With these were shown photographs displaying the "sternal symptom"; and others of plaster cast, No. 676, in the Museum of St. Thomas's Hospital—probably the most striking instance known of wide cancer-diffusion by the marrow, without any tumour-formation on the bones. Further photographs of the same peculiar condition in women with naturally prominent sterna were produced at the Nottingham Meeting of the Association in 1892, together with a specimen illustrating the mechanism of its production *per* the vestigial Thymus. Of this latter communication, a note is (heterogeneously) inserted in the *Journal* for Sept. 24 in that year (p. 680).

Case 1. "Trindles." Scirrhus of right breast in woman aged fifty-one, who died in the Cancer Hospital with acute mania and with co-existing phthisis. Thin sections exhibited showing scirrhus acini in cancellous tissue of head and shaft of right humerus; in ditto of left in marrow taken from both bones; in cancellous tissue of a lumbar vertebra. No bone symptoms during life. Thin sections and bones exhibited.

Case 2. "Hill." Scirrhus of the right breast in woman aged fifty-eight. Scirrhus acini in right and left humeri; also in cancellous tissue of lumbar vertebra. Bones and microscopic sections therefrom exhibited.

Case 3. "Hewett." Scirrhus of both breasts, the right primarily, in a woman aged forty-three. Typical scirrhus acini in marrow and

in cancellous tissue of upper epiphyses of both humeri. These bones, with the sections, exhibited.

Case 4. "Phillips." Scirrhus of left breast in woman aged forty-two. Scirrhus acini in left humerus; large cells, not arranged in acini, scattered through the marrow; the sternum infiltrated, but possibly by contiguity of tissue; a mass adherent to thoracic parietes.

Case 5. "Anson." Scirrhus of both breasts, the left primarily, in woman aged seventy-eight. Scirrhus acini and large cancer cells, mingled with abundant myeloplaxes in both humeri.

Case 6. "Carlisle." Scirrhus of left breast in woman aged fifty. Typical acini in right humerus; the sternum infiltrated (but possibly by contiguity). At the necropsy several of the ribs, not included in the diseased area, found to contain small nodular tumours, which, on microscopic examination, proved to be scirrhus deposit.

Case 7. "Emma B." Cancellous tissue in head of left humerus, with scirrhus acini; secondary to disease of left breast; brawny œdema of arm; bone cut easily with knife.

Case 8. "Martha S." Scirrhus deposit in seventh cervical vertebra, secondary to disease of left breast; not insidious; paraplegia and local tenderness, but no tumour.

Case 9. "Mildred W." Also not insidious, but important as showing wide diffusion; primary encephaloid carcinoma of left breast; two bony growths on sternum; large tumours on left parietal bone, left scapula, and right femur; the femur fractured shortly before death.

Case 10. "Foot." Scirrhus of both breasts, primarily of the left, in a woman aged thirty-eight; duration about three years; the left breast excised eighteen months previously at the London Hospital, typical scirrhus acini in the left humerus and in a lumbar vertebra.

Case 11. "Daw." Two large cancerous masses in left cerebral hemisphere, consecutive to scirrhus of the right breast, in a woman aged forty-one; profound coma for seven weeks before death; disorganisation of articular cartilage at head of right humerus; sternal prominence noted during life; sternum found filled with scirrhus deposit; no direct infiltration; in the humeri, some fatty degeneration of the marrow, but no malignant deposit found—the only instance among the nine positive cases in which these bones were examined with a negative result.

(b) *Melanotic Epithelioid Cancer*.*

These cases demonstrate the ordinary mode of causation ; curability by operation of the initial lesion ; wide dissemination *per* the blood and lymph ; partial pigmentation of the metastases, &c.

Case 1. A gardener, aged twenty-eight, had several congenital moles on the left forearm, one being large and prominent. The top of this was knocked off, and in order to heal the sore first spirit of salt, then chloride of sodium were applied. Excision of the resulting tumour, after a year at a general hospital, left a scar an inch and a half long and half an inch wide, which remained healthy until the patient's death. Two years after the operation an axillary tumour was removed at the Cancer Hospital ; it was as large as a turkey's egg, was deeply pigmented in the middle, while each end of the ovoid mass was perfectly free from colour. Death took place one year subsequently, when large masses of round-celled growth, devoid of pigment, covered the whole peritoneum.

Case 2. A charwoman, aged fifty-three, was admitted into the Cancer Hospital with a large axillary tumour secondary to a melanotic growth on the left middle finger, which had been previously removed at a general hospital. There were ascites and very numerous visceral metastases. After death the axillary mass was found highly pigmented ; numerous pulmonary and pleural nodules less so ; large deposits in the liver, peritoneum and omentum. On the left middle finger was a very small, white, healthy scar.

Case 3. A woman, aged fifty, accidentally wounded the skin about the left great toe-nail ; the sore never healed. Several operations, including scraping of the ulcer and evulsion of the nail, had been performed at a general hospital and by the private medical attendant. When received into the Cancer Hospital there was a small fungating tumour an inch in diameter on the left great toe, and a huge mass of lymph-glands, some black and ulcerated, in the corresponding groin. Near the latter were numerous subcutaneous nodules, some pigmented, others whitish. The necropsy showed abundant visceral deposits only partially pigmented.

Case 4. A married woman, aged thirty-five, had a congenital melanotic wart on the pubes. This was irritated by the lochial discharge and neglect to change the diapers. The wart began to grow, was ligatured by the medical attendant, then became very painful and grew still more rapidly. When first seen the patient was three months advanced in a fresh pregnancy, and had extensive deposit in the glands of the groins. Eventually diffuse pigmentation of the whole *mons veneris* took place, the skin becoming puffy and of a bluish-black colour. Under the stimulus of pregnancy death very speedily ensued, with metastases in the inguinal glands on both sides, both lungs, both pleuræ, the liver and the mucous membrane of the stomach.

* From abstract of lecture on *Melanotic Cancerous Disease*, delivered at the Cancer Hospital, and subsequently published in *The Lancet* of October 15, 1892.

(c) *Cancerous Conversion of Benign Mammary Cysts.**

CASE 1.—*Illustrating association with Spindle-Sarcoma.*

Cyst of left breast, stationary for fourteen years; then undergoing rapid increase while the patient was nursing a sick husband. Excised and found to be filled with embryonic fibrous tissue, apparently of recent formation.

Eliza S., aged sixty. Married. Admitted into Cancer Hospital, April 5, 1886.

Duration of tumour.—Fourteen years.

Family history of cancer.—Nil.

Causation.—A "lump" in the breast first felt fourteen years since; was then treated by a doctor, with the supposed effect of producing some diminution in size. Is certain, however, that a tumour has been present ever since; and that it remained perfectly stationary till three months ago. No injury. Husband seriously ill, four months previously; and some troubles before this.

Present state.—To outer side of left breast rather elongated tumour, as large as an orange, freely movable; with small projecting bosses. Is not so hard as scirrhus; no lancinating pain; no pain except when touched. Axillary glands very tender, and slightly enlarged.

Breast excised April 10, 1886; and axillary contents removed at same time. The tumour proved to be a cyst, filled with densely packed vegetations.

Lymph-glands found to have a yellowish deposit in centre. A microscopic examination showed the vegetations to be composed of newly formed fibrous tissue, in parts very embryonic; here and there also, large collections of embryonic (spindle) cells; in the lymph-glands, no malignant feature.

Patient in good health, and free from any reappearance, when last seen (in October, 1889).

CASE 2.—*Also illustrating Sarcoma-development.*

Breast-cyst apparently of fourteen years' duration. Sudden increase after injury, two months previously. Cyst excised; and found to contain vegetations of recent origin. Walls of cyst composed of embryonic fibrous tissue.

Mary H., aged forty-four. Married; eight children; baby four months old, not nursed. Admitted into the Cancer Hospital, December 10, 1888.

* From Appendix B, in *The Reappearance of Cancer*.

Family history.—Father had cancer of lip. Mother died of cancer of the rectum. Sister died of breast-cancer.

Causation.—Fall two months previously, striking just behind the breast. Also some recent mental trouble.

Duration.—Fourteen years; noticeable increase three weeks.

History and present state.—A strongly-built healthy-looking woman; husband a schoolmaster in Wales. Abscess of breast fourteen years ago; since then, "always a hardness." No pain or increase in size prior to injury, two months ago; for past three weeks, much pain, and rapid enlargement.

Towards the outer side of the left breast, a large globular elastic fluctuating tumour (about the size of a large orange), freely movable. No enlarged glands. Nipple retracted; but has always been so.

On excision, a single cyst, containing a blackish fluid, and presenting also some very small vegetations, was encountered. The thick walls of the cyst were found to be composed of very embryonic fibrous tissue (spindle cells with relatively large nuclei);—they were evidently therefore in an incipiently sarcomatous stage. At one point, a pigmented induration was present; which was carefully examined for scirrhus deposit—but with negative results.

The patient was well, when last seen in September 1889.

CASE 3.—*Showing Eventual Association with Carcinoma.*

Encephaloid (acute scirrhus) disease of left breast. Tumour, probably cystic, of twenty-one years' duration. Rapid increase, and appearance of cancerous features after sudden death of husband. Two operations quickly followed by "recurrence."

Martha P., aged forty-six. Widow; three children. Admitted into the Cancer Hospital, March 1, 1886.

Family history.—Nil.

Duration.—Tumour twenty-one years; increase eight years. Since then, two operations and "recurrence."

Causation.—No injury. Much trouble; malignancy began after sudden death of husband eight years ago.

History and present state.—First felt a "lump" in the breast after birth of first child, now aged twenty-one years. This continued about the size of a hazel-nut until eight years ago, when great shock by sudden death of husband. Patient noticed an enlargement "as soon as she was getting over her trouble"; had then to turn out and earn her living as cook. Now rapid growth; is sure tumours were identical. Operation in three weeks at Homeopathic Hospital; a

"recurrence" as soon as wound healed, and in six weeks, a second operation. Disease reappeared nine weeks after the latter.

A very puckered cicatrix; whole of breast-tissue has been removed. In centre of scar, a prominent livid ulcerated tumour, with hard base. Beyond the reach of operative treatment; to attend as out-patient. (The fungous growth had already existed three years.)

CASE 4.—*Also Carcinomatous.*

Tumour of eight or nine years' duration (probably cyst or cystic fibroma) assuming malignancy, and undergoing rapid increase after death of husband. Excision. Found composed of multiple cysts, with small scirrhous deposit.

Elizabeth W., aged fifty-six. Admitted into the Cancer Hospital, August 24, 1883.

Family history of cancer.—Nil.

Causation.—No injury. Always much trouble and hard work. Husband died three months previously; had nursed him through a five months' illness, and had sat up much at night.

Duration.—Eight or nine years; increase, three months.

History, &c.—A small tumour had existed for eight or nine years; and the nipple had been retracted four or five. No pain or inconvenience till death of husband; since then a progressive increase.

Breast as large as two fists, rounded, prominent; over the greater part, indistinct fluctuation; the base generally hard; nipple retracted completely,—from its side protrudes fluctuating tumour one inch in diameter. Skin over this reddened. No enlargement of axillary glands perceptible, and humerus unaffected. Occasional lancinating pain; patient, a pale, grey-haired, rather stout woman.

Excision of breast and of axillary contents, August 31, 1883. Tumour mainly composed of cysts, containing a dark-green fluid; when this had been evacuated, a soft ashy-grey material (apparently altered blood-clot), found lying loose in the loculi. The inter-cystic material generally, fibrous; at one point, was "gritty" on section, and presented the typical features of scirrhous (yellowish-white puncta in a hard quasi-gelatinous base). One axillary lymph-gland as large as a horse-bean.

The patient was subsequently lost sight of.

CASE 5.—*Carcinomatous.*

Cystic breast tumour of five years' duration; increase noticeable for four months only.

Annie B., aged thirty. Married. Two children. Admitted into Cancer Hospital, July 3, 1884.

Family history.—Father's mother died of tumour in left breast. No other cancerous relative.

Duration.—About five years; increase four months.

Causation.—No injury; hard work; some recent mental trouble (particulars not ascertained).

History and present state.—Tumour has existed five years; became painful and began to increase four months ago.

Nipple retracted; continual discharge of serous fluid. Deep in substance of left breast, a hard tumour, freely movable. In the axilla, several glands as large as hazel-nuts.

Excision of breast, and of axillary contents July 8, 1884. Tumour proved to be scirrhus, in parts softening; much fibrous tissue under nipple—(but no cyst-wall to be clearly made out, owing to advanced "liquefactive degeneration").

CASE 6.—*Carcinomatous.*

Cyst of five years' duration; noticeable increase for one year, and conversion into scirrhus cancer.

Mary J., aged fifty-one. Married. Admitted into Cancer Hospital, April 3, 1884. Nine children.

Family history of cancer.—Nil.

Duration.—Five years.

Causation.—No injury. No mental trouble. Large family. Hard work as laundress.

History of present state.—Has felt tumour for past five years; but no inconvenience or increase in size till past year.

Now in left breast, towards outer side, a fluctuating tumour, freely movable, of size of large walnut. In both axillæ, lymph-glands somewhat above the normal size; but larger on the left; no marked increase in bulk.

On April 29, puncture with trocar. About $2\frac{1}{2}$ ounces of straw-coloured fluid evacuated; complete collapse of cyst; and no solid base felt subsequently.

Speedy re-filling; increased axillary enlargement; induration

around base of cyst; and slight retraction of nipple. On June 10, the breast and axillary contents were removed; the breast tumour proved to be scirrhus, with extensive deposit in the lymph-glands, softening and breaking-down. The patient was discharged apparently well on July 19.

(d) *Cancerous Course of Mammary Adeno-Fibroma.**

Cystic fibroma of left breast; of uncertain duration,—noticeable increase for past two years. Excision of mamma. Microscopic appearances negative of malignancy. Speedy reappearance in the form of scirrhus; and death with extensive secondary deposits.

Sarah K., aged sixty-four. Married. One child. Admitted into Cancer Hospital, February 22, 1887.

Duration (apparent) of tumour, two years.

Family history.—Father died of cancer of eyelid. No other cancerous relatives.

Causation.—No injury; no history of muscular strain. Much trouble for past six years. Had abscess after birth of child twenty-one years ago; ever since a small "kernel." Doctor at confinement said this might become cancer. Has dreaded cancer ever since.

Present state.—Fairly healthy general appearance. In upper part of left breast, a tumour as large as a small orange, freely movable; in centre of this, a projecting boss which fluctuates. No retraction of nipple or adhesion of skin. Slight tenderness under edge of pectoralis; no glandular enlargement, however, to be felt.

Breast excised February 25, 1887; contents of axilla not interfered with. The tumour proved to be a cyst in the midst of firm white fibrous tissue; no intra-cystic vegetations; and no indications, to the naked eye, of malignancy in any shape. The microscopic appearances corresponded very closely to the engraving of adeno-fibroma, in Dr. Green's well-known *Manual of Pathology*, fifth edition, p. 160; small cysts filled with epithelioid cell-growth, scattered through a thick basic structure of well-organised white fibrous tissue. The only slightly suspicious feature was that, here and there, some of the intra-cystic cells appeared somewhat to encroach upon the enveloping solid framework of the neoplasm. Nothing in the least approaching the features of Scirrhus on the one hand, or of Spindle-carcoma on the other, could be detected on careful examination.

Some sphacelus of the skin-flaps retarded recovery, but the patient

* *Op. cit.* Appendix C.

was eventually discharged well, and without any cancerous indication, on July 30, 1887.

March 26, 1888.—Re-admission with extensive livid cancerous (scirrhus) deposit in and about cicatrix. Very harsh clanging cough; evidences of deposit in left lung (areas of consolidation); left hydrothorax; probable deposit in mediastinal glands. Glandular enlargement in left axilla and above clavicle. Rapid downward progress, and death on April 24, 1888. The post-mortem examination showed extensive cicatricial, axillary, and intra-thoracic deposits; a microscopic examination of the first revealed typical scirrhus acini, embedded in the fibrous tissue.

Fig. 1. in Plate XIV. shows a microscopic section of the tumour in this case. The columnar epithelium which once lined the spaces has been effaced by mucoid degeneration; the text-book plate referred to shows the lining membrane in an earlier stage, with abundant vegetations. Each tiny cavity was once an acinus; whereof the parenchyma has undergone a proliferation of cancerous character, and which is on its way to become transmuted into a microscopic cyst. Some of the larger spaces in an average section may be referred to ducts. Every such cell-collection is practically a very minute cancer-focus, differing only from those of an ordinary carcinoma in that there is greater relative hypertrophy of the enveloping fibrous tissue, and a more copious fluid secretion by the new cells, with concomitant mucoid decay. Hence the tardy super-vention of malignant symptoms; such as infiltration of the surrounding parts, and infection of the axillary lymph-glands. The dilatation is a passive condition, a consequence of excentric fluid-pressure; the corrugated walls of the cavities readily favour the production of intra-cystic vegetations. The causes of this tumour-formation in the devolutionary mamma are identical with those of carcinoma; see further remarks at p. 214.

PLATE I.

The Formation-process of the *Globe Epidermique*. The section was from a case of Epithelioma at the margin of the anus. The nuclei are alone represented. $\times 240$. (A, eyepiece; D D Zeiss, objective.)

FIG. 1.—FIRST STAGE. Mass of malignant epithelium, with three central "cloudy areas."

FIG. 2.—SECOND STAGE. In the centre of a "cloudy area" appears a roundish space, which in a logwood-stained section exhibits a dusky tint; and which commonly contains one or two very dark or highly refracting globules of fluid. The outline of the incipient *GLOBE* is as yet ill-defined and hazy, with no trace of imbrication.

FIG. 3.—THIRD STAGE of the typical *Globe Epidermique*. A central area containing two highly refracting vesicles, and infiltrated by some mucoid fluid; around this are layers of compressed cells, the imbricated appearance being marked in proportion to the obliquity of the section. External to the *globe* is seen the "cloudy area" of degenerating cells, which are gradually becoming converted into flattened scales, so that the whole will be eventually merged in the "laminated capsule." In a logwood-stained section, the dusky hue has here become much more pronounced.

FIG. 4.—A column of the parenchyma with its "cloudy areas" almost wholly converted into a single large compound *globe*. At *a, a*, a small number of the degenerating cells still survive.





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PLATE II.

FIG. 1.—From a section of EPITHELIOMA in the Tongue, $\times 240$; but slightly diagrammatic, as at each upper corner traces of the normal epithelium have been placed, in order to show the natural relation of the parts. The whole of the epithelial coat had been here obliterated by ulceration. Into the interstices of the sub-mucous connective-tissue, &c., the malignant cells are seen inserting themselves in irregular columns. Their nuclei are alone represented. The fibrous trabeculae were crowded with leucocytes, also omitted in the drawing.

FIG. 2.—Cells from a lingual EPITHELIOMA obtained by scraping surface of fresh specimen, and staining with dilute gentian-violet.* In *a* are seen two vacuoles (vesicles of mucoid fluid), with two still undegenerate nuclei. $\times 240$.

FIG 3.—SCIRRHUS (Chronic Mammary Carcinoma), $\times 50$. (A Zeiss, objective; A, eye-piece.) The nuclei alone represented, and the abundant leucocytes omitted. At *a*, are seen the characteristic alveoli amid the normal fibrous-tissue base of the mamma. At *b*, adipose tissue is invaded; the fat-cells becoming gradually crumpled up, and eventually obliterated by the cancer-parenchyma.

* It may be here pointed out that only the *relative arrangement* of cancer-cells can be properly studied in cut sections. The size and physical features of the individual cell are profoundly altered by immersion in any of the usual hardening media, as also by the lapse of time; and should always be investigated in a perfectly fresh "scraping."



Fig. 1.

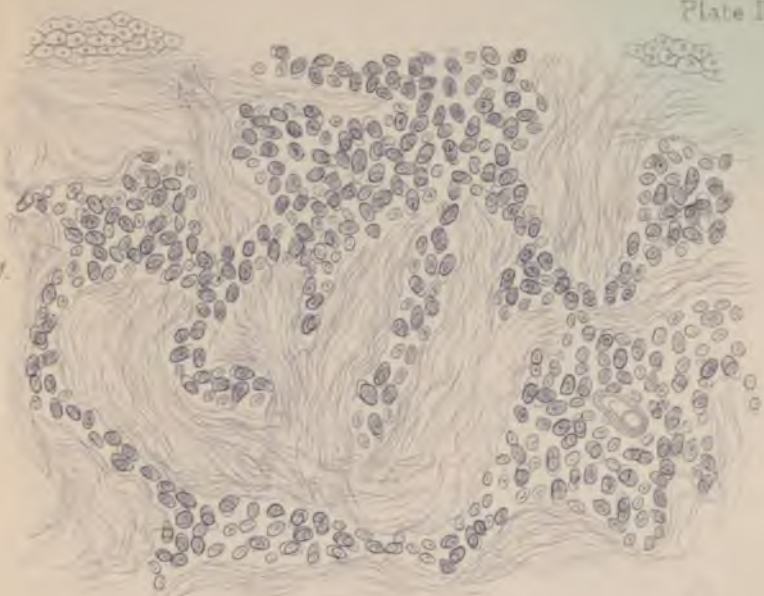


Fig. 2.



Fig. 3.



PLATE III.

FIG. 1.—ENCEPHALOID (Acute Mammary Carcinoma), $\times 270$.
Exuberant cell-proliferation, with scanty residua
of the normal stroma. The nuclei only shown.

FIG. 2.—Cells from acute CARCINOMA of Breast, $\times 530$.
($\frac{1}{12}$ th o. i. Leitz; A, eye-piece.) Fresh.

FIG. 3.—Carcinomatous INTRA-CYSTIC VEGETATION (so-called
“Duct-Cancer”), $\times 110$. (A Zeiss, objective; C,
eye-piece). At *a*, free border of the villous growth,
coated by several layers of columnar epithelium.
Within are irregular cavities lined also by columnar
cells; around these the solid tissues are diffusely
infiltrated by malignant cells without any regular
distribution. The leucocytes omitted: as usual in
these Plates, and in most other delineations of
cancerous disease. The nuclei of the infiltrating
cells are alone depicted.

Fig. 1



Fig. 2



Fig. 3



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PLATE IV.

FIG. 1.—From a small and recent SPINDLE-SARCOMA on the palmar aspect of a man's thumb, $\times 50$. At *a*, is shown the transition of the normal staff-shaped nuclei into malignant ditto, oat-shaped, or fusiform. The nuclei alone depicted. At *l*, a small group of leucocytes; the bulk being omitted.

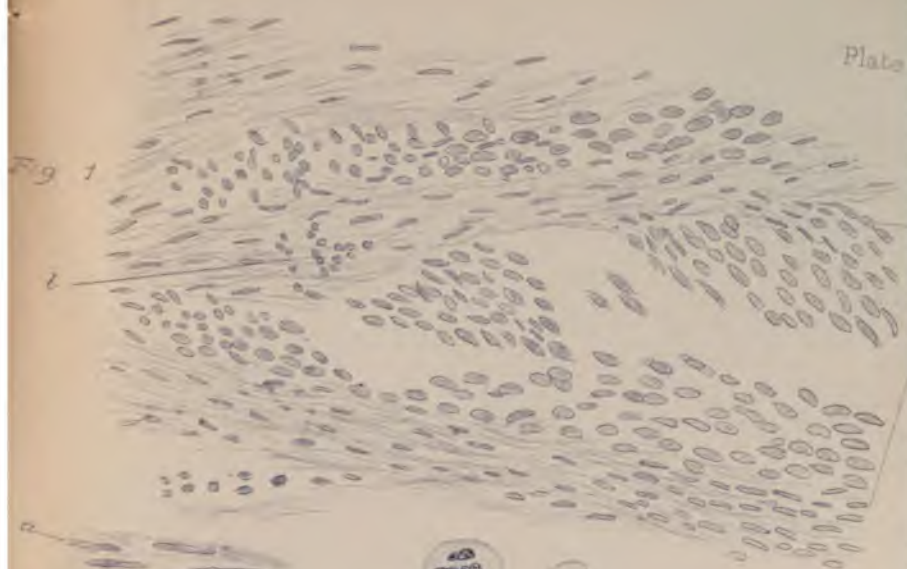
FIG. 2.—Portion of same, $\times 530$. At *a*, the nuclei are normal; at *b*, they are seen swollen, becoming oval, and eventually undergoing fissiparous cleavage. At *c*, are the relatively huge malignant cells.

FIG. 3.—Cells from a recurrent Spindle-Sarcoma within inter-muscular spaces of thigh. Fresh. $\times 240$.

FIG. 4.—Cell *e* in preceding, $\times 530$.

FIG. 5.—Giant-Corpuscles (Myeloids) detached. Taken from a spindle-sarcoma in the head of the tibia, $\times 240$. See Plate XI. for average microscopic aspect of spindle-sarcoma tissue.

Fig. 1



PLATES V AND Va.

MARROW-INFECTION BY BREAST-CARCINOMA.

FIG. 1.—Plaster-cast in Museum of St. Thomas's Hospital, taken from body of woman who died from breast-carcinoma. Shows extreme marrow-infection, here "non-insidious." The pelvic bones and thorax are painfully distorted, the sternum having sunk almost to contact with the spine. Both humeri and femora had been repeatedly fractured.

FIG. 2.—Insidious Carcinoma-deposit in sternum, from case "Daw." The shaded parts are bone-matrix.
× 50.





Fig 2.



Fig 1.

V A.

FIG. 1.—The “Sternal symptom” of insidious marrow-infection. The characteristic prominence is marked x. It here preceded the signs of secondary-deposit in the opposite breast by about two months.

FIG. 2.—Deposit in lumbar vertebra. Case “Hill.” Shows fibrotic induration of marrow; which when thus affected, becomes of a *dull opaque-white colour, pathognomonic to the naked eye of carcinoma-deposit.* x 50.

See cases at pp. 363, 364.



PLATE VI.

FIG. 1.—LYMPHO-CARCINOMA. Section from Case 24 in table.

The meshes of an inguinal lymph-gland occupied by malignant parenchyma, eroding the fibrous tissue, and at the same time advanced in liquefactive degeneration. The stroma crowded with leucocytes. Under low power. $\times 50$.

FIG. 2.—*Ibid.* Cells (fresh) from a primary cancer of the cervical glands.

(a) Under medium power. $\times 240$.

(b) Under high ditto. $\times 530$.

(c) Under $\frac{1}{12}$ th o. i. Leitz; C, eye-piece. $\times 1100$.

FIG. 3.—MELANOTIC SARCOMA (True). From a recurrent case originating within the orbital cavity. Clusters of malignant spindle-cells within loculi; the older undergoing melanotic degeneration. Detached granules and larger masses of pigment stud the septa. $\times 240$.

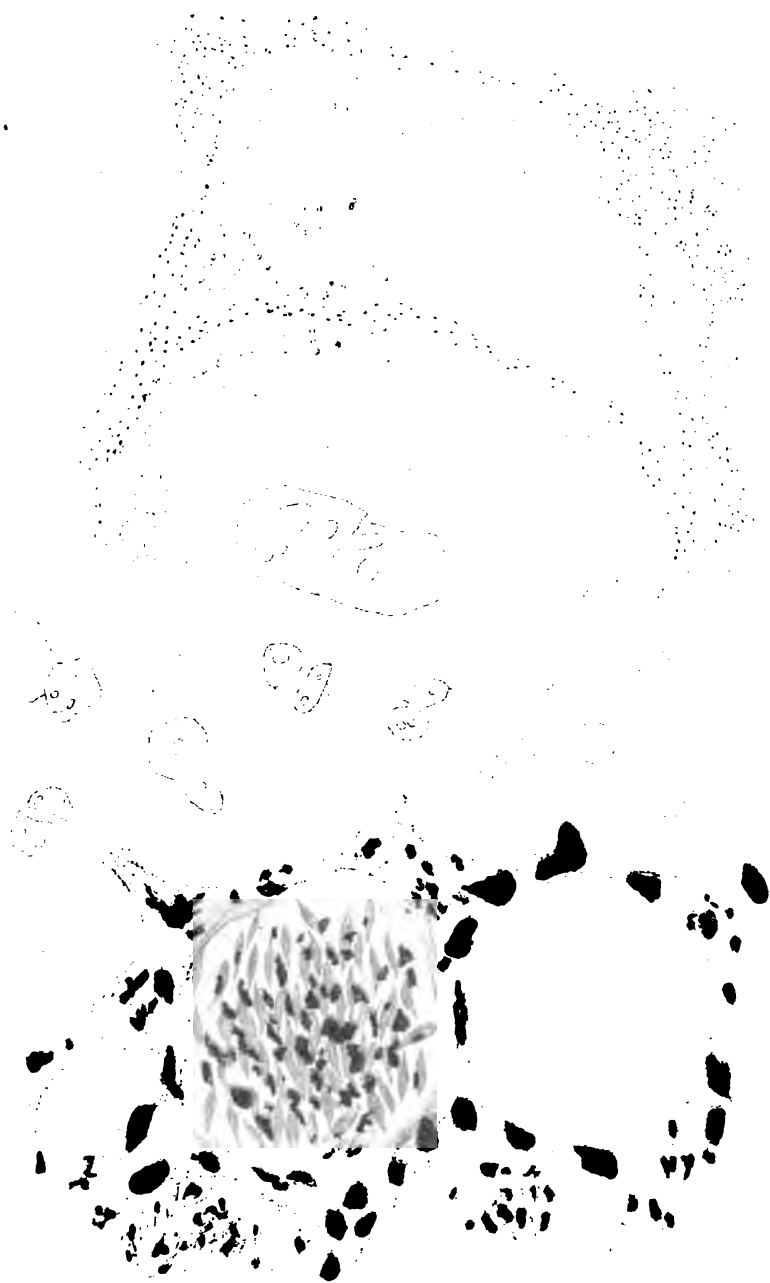


PLATE VII.

FIG. 1.—A solitary cell-column of RODENT ULCER. $\times 120$.

- (a) Minute cells of new-growth, at one point projecting an offshoot into healthy fibrous tissue around.
- (b) Lumen of hair-follicle filled with similar parenchyma.
- (c) Sebaceous gland, still healthy. (Cf. Pl. VIII.)

FIG. 2.—CYLINDROMA.

From case of rectal cancer. $\times 50$.





PLATE VIII.

RODENT ULCER, $\times 50$. From section traversing the whole, and including the tissues adjoining.

At *a*, in the centre, the inosculating columns of small-celled parenchyma characteristic of this cancerous lesion. Over this the surface-epithelium has been removed by ulceration ; on each side it is seen at *d*, *d*, intact, and greatly hypertrophied.

c c, are sections through the lumen of hair-follicles ; the hair having fallen out.

b, b, b, small *globes epidermiques* in the heaped-up masses of non-cancerous epithelium. The leucocytic element has been omitted.

(Cf. Plate VII.)





PLATE IX.

FIG. 1.—MELANOTIC EPITHELIOID CANCER. From Case 4 in Appendix C. The section skirts a hair-follicle. It shows proliferation of the deeper cells appertaining to the Malpighian rete, their clump-like arrangement, and eventual pigmentary degeneration. $\times 50$.

- (a) Stratum corneum of epidermis.
- (b) A few remaining columnar cells of the outer root-sheath.
- (c) A cluster of nuclei not yet pigmented.
- (d, d, d) Large groups of ditto, fully converted into melanine.

FIG. 2.—More advanced stage of disease in another part of same section. $\times 240$. Huge cells, undergoing subdivision, and occupying the pouches of a fine connective-tissue stroma. The nuclei are progressively degenerating into pigment; which in this variety largely replaces the mucoid degeneration-product of non-pigmented epithelium, as seen in Plate I. Fragments of melanine are scattered over the septa. Tumours with such an appearance have been described as "Alveolar Sarcoma." This lobular arrangement is particularly well-shown when melanotic cancer is secondarily deposited in the adenoid reticulum of a lymph-gland.

At a, a, vacuoles.



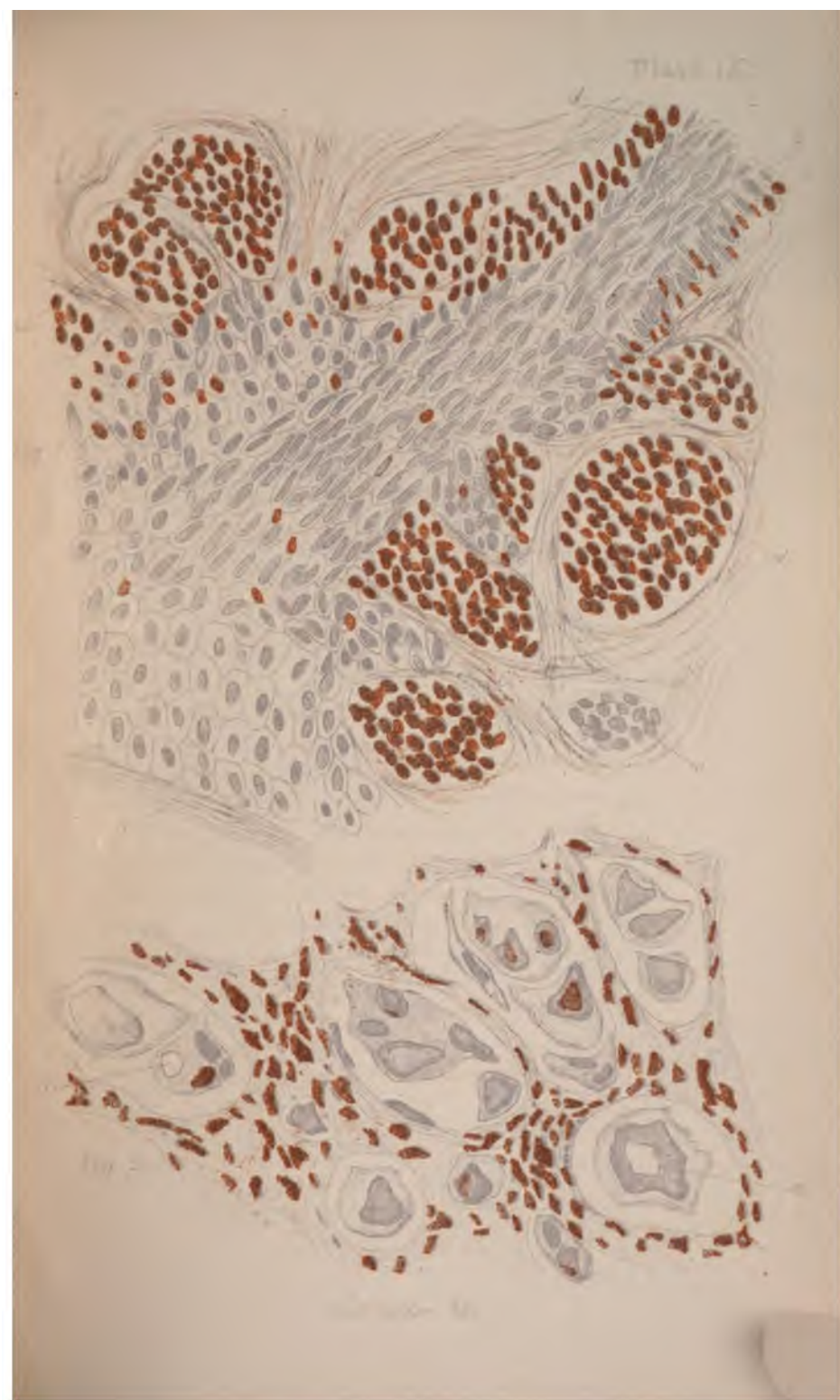


PLATE X.

FIG. 1.—MYXOMA (of "mixed" type). From case in subcutaneous tissue of thoracic wall, repeatedly recurring after operation. A small fragment of the jelly-like material was pressed fresh upon the slide, and stained with dilute gentian-violet. An irregular network of fibres, with large spindle-nuclei, here and there breaks up into detached cells of the spindle-sarcoma type.

a, a, a, are detached spindles, with elongated filiform ends. $\times 240$.

FIG. 2.—MYO-SARCOMA.

From uterine case under Mr. Lawson Tait, recurrent after operation. The sections are from different parts of the same tumour, and show the characteristic diversity of microscopic appearance. $\times 240$.

- (a) Region of spindle-celled growth.
- (b) Region of small lymphoid cells or nuclear bodies, found in the meshes of a loose stroma soaked in serous exudation, and resisting protoplasm-stains.

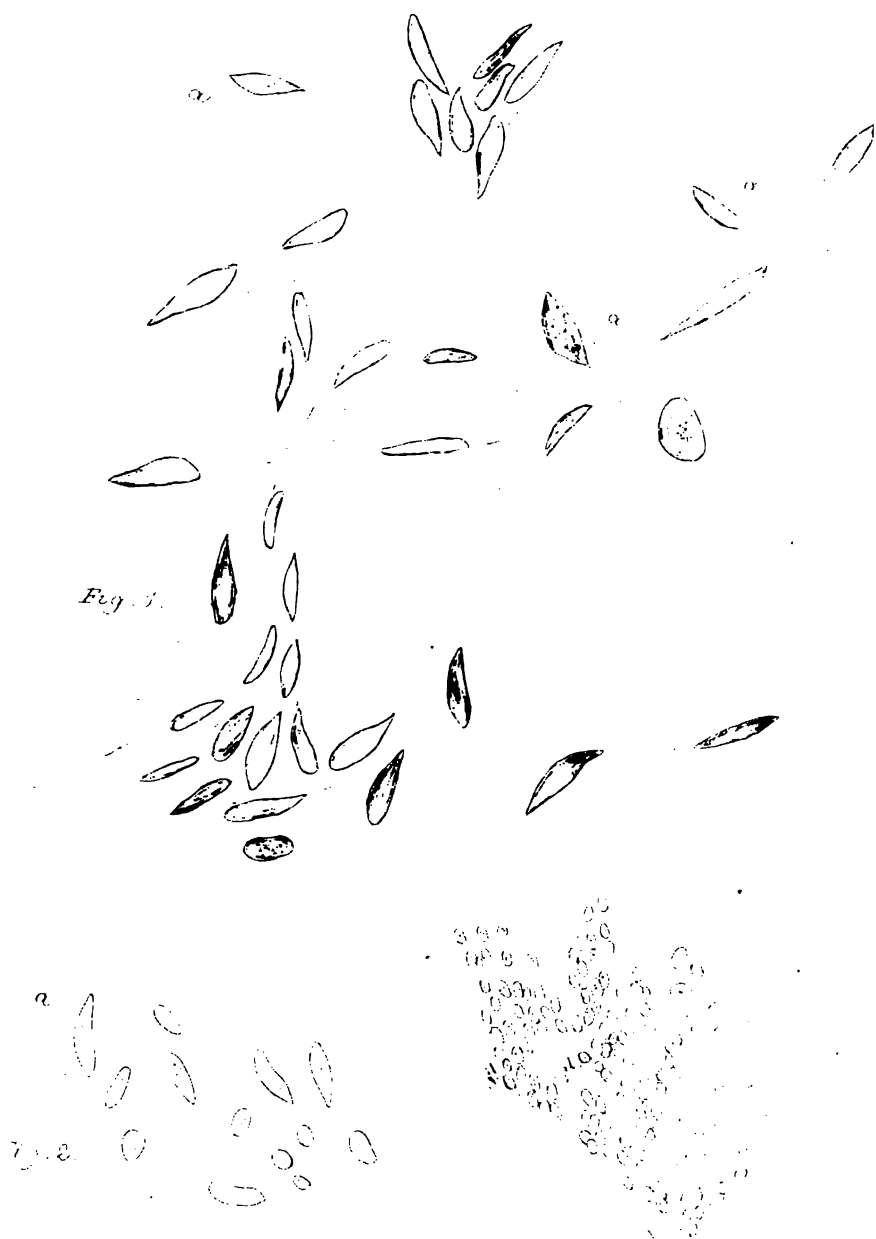


PLATE XI.

FIG. 1.—ENDOTHELIOMA.

c. New-growth, here uncovered by pleura.

From section in case of Primary Cancer of Pleura, kindly lent me by Dr. Joseph Coats. $\times 50$. The new-growth is interstitial between the layers of the pulmonary pleura.

a. Pleura, separated into two layers by the new parenchyma.

b. Lung-tissue, studded with pigment-masses.

FIG. 2. — Spindle-Sarcoma with Giant-Corpuscles, ("Myeloids.")* From case in head of tibia. $\times 240$.

* The entire outline of the corpuscles is not so distinct as here represented; a portion only is free, and there is partial attachment to the enveloping tissue. Usually associated with Spindle-celled Sarcoma, I have found them abundant in the connective-tissue stroma of a specially vascular mammary Carcinoma simulating to the naked eye a melanotic cancer. So far as I have seen, the condition is always associated with extreme hyperæmia, and superabundant leucocytic immigration. The nuclear bodies within the Giant-Corpuscles are leucocytes embedded in an amorphous material. The latter mainly seems to be fibrinous in character; the "Myeloid" to be a plug filling the lumen of a lymph-space, lymphatic or capillary, the plug being seen in cross-section. Hæmic origin is often indicated by rusty coloration, in a logwood-stained section. The theory of a necrotic source seems incompatible with the absence of degeneration in the adjoining cells. Whatever their etiology in tuberculosis, the giant-corpuscles of cancer must be regarded as minute blood-clots, or lymph-coagula. The most enclose a variable number of leucocytes, and sometimes also a few malignant nuclei; but these bodies may be perfectly devoid of any cell-structure whatever.

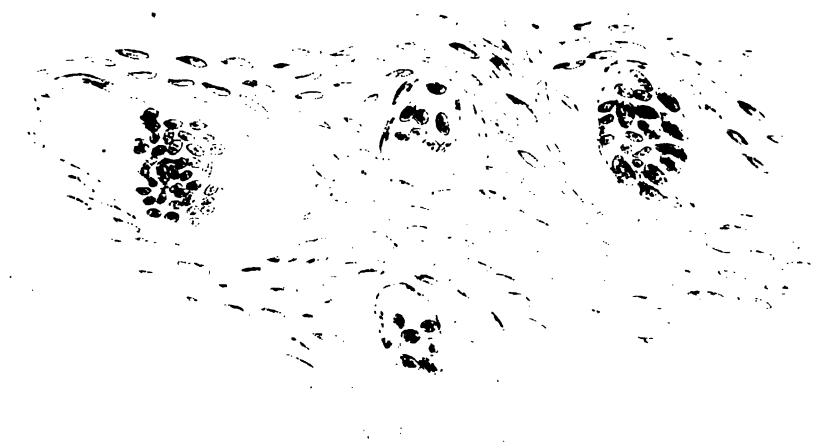
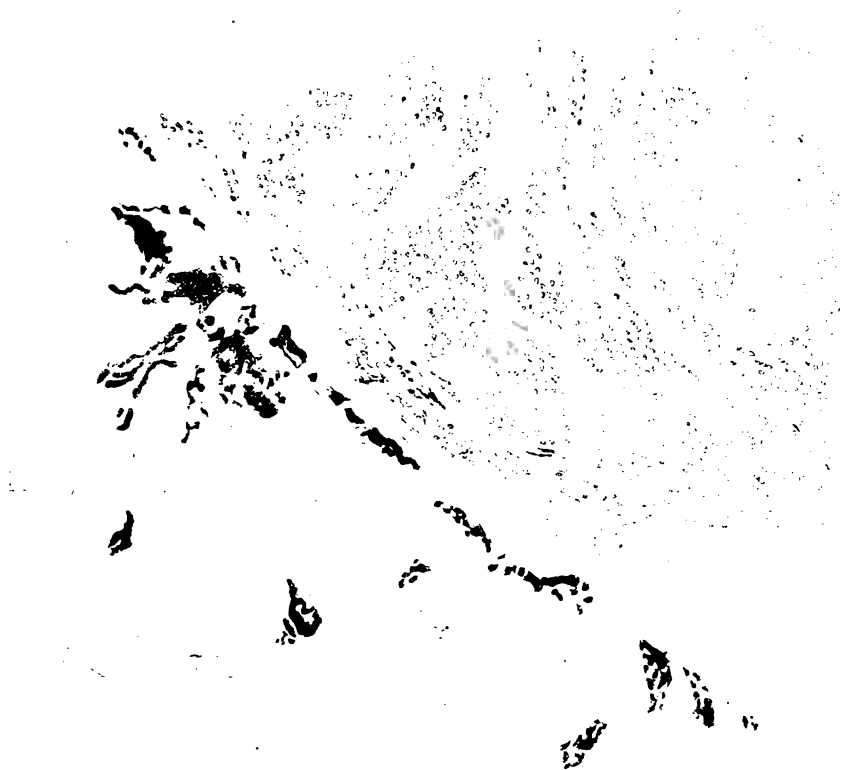


PLATE XII.

FIG. 1.—VILLOUS PAPILLOMA OF BLADDER.

The end of a single villus. A slender stalk of fibrous tissue, studded with leucocytes is fringed on each side by numerous layers of very elongated cells, mostly spindle-shaped; of mixed connective-tissue and epithelial origin. $\times 440$.

FIG. 2.—GLIOMA (from cervical part of spinal cord). $\times 240$.

Irregularly-shaped cells with round or ovoid nuclei, embedded in a granular faintly-fibrillated stroma.

FIG. 3.—CARCINOMA (ordinary) of THYROID BODY. $\times 50$.

a, a. Vesicles of the special fluid secretion.



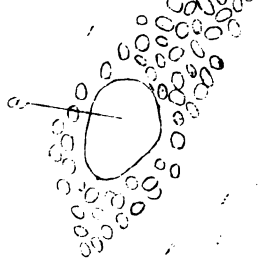
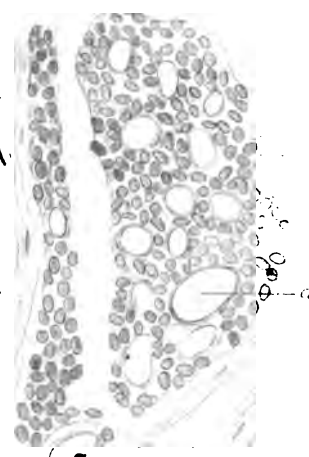
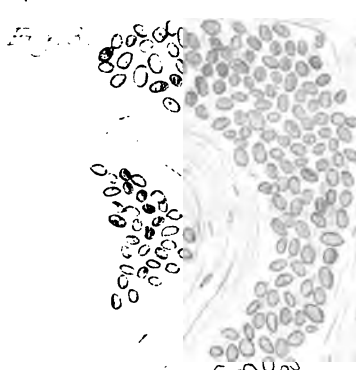
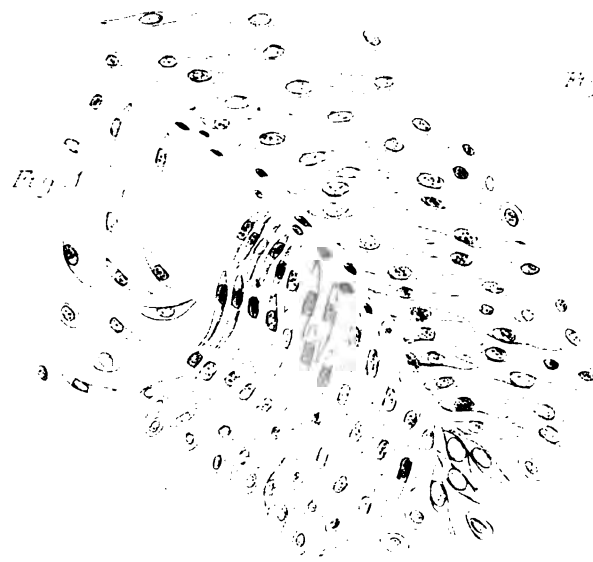


PLATE XIII.

"COLLOID" CANCER.

FIG. 1.—A Cylindroma of the rectum, in which the tubules are enormously dilated and filled by very large plugs of the usual mucoid secretion, *a, a, a*. Compare with Fig. 2, Plate VII. The disease presented, to the naked eye, the aspects of "colloid."
× 50.

FIG. 2.—Mucoid degeneration of the parenchyma in a mammary carcinoma; the so-called "colloid." × 50.

a. Active carcinoma-cells.

b. Vesicles of mucoid fluid.

c. Areas of more or less amorphous colloid degeneration, in which the cells stain faintly; and their nuclei are becoming indistinguishable. The interlobular stroma, between the cell-collections, is distinct and seems slightly hypertrophied. Thus is produced the alveolar appearance of the cut surface.

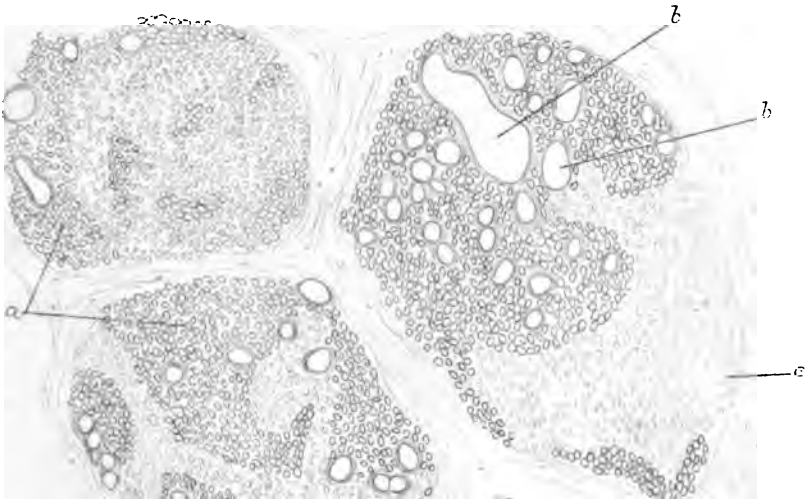


Fig. 2

PLATE XIV.

FIG. 1.—A CYSTIC FIBROMA of the female breast, becoming carcinomatous. From case of Sarah K., in Appendix C. To the naked eye the thin section presented the cribriform appearance which characterises the Cystic or Adeno-Fibroma of middle or old age. The minute cavities (cysts in embryo) are formed by the acinar epithelium, which proliferates abnormally; the resulting cell-masses undergoing degeneration into liquid, with dilatation of the enveloping stroma. Only the nuclei shown.

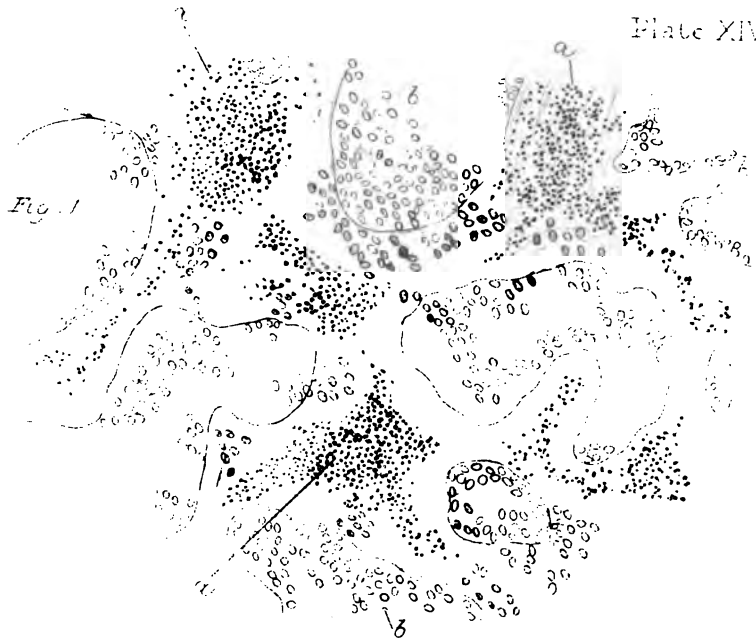
At *b, b*, some of the still remaining cells are seen invading their fibrous walls, and in places penetrating along the perivascular lymphatic sheath. The abundance of the leucocytes at *a, a*, indicates approaching cancer-development.

× 50.

FIG. 2.—From a Carcinoma of the Ovary. Shows the cystic characters prevalent in ovarian cancer. Irregular spaces are seen, lined by columnar epithelium; the connective-tissue basis contains many leucocytes. × 50.

FIG. 3.—From another case of ovarian carcinoma, showing formation of an INTRA-CYSTIC VEGETATION. *a, a*, Inner wall of minute cyst, here bared of epithelial lining by detachment of small shred of fibrous tissue, which projects into the cavity. *c, c*, Columnar epithelium lining cyst. *b, b*, Nascent ditto on stalk of recently-detached vegetation. × 240.





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